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EPA Utility FGD Survey: July - September 1980

PEDCo-Environmental, Inc.
Cincinnati, OH

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

Oct 80

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16. ABSTRACT

This report is the last of three supplements updating the October-December 1979 report (EPA-600/7-80-029a) and should be used in conjunction with it. The report, which is generated by a computerized data base system, presents a survey of operational and planned domestic utility flue gas desulfurization (FGD) systems, operational domestic particle scrubbers, and Japanese coal-fired utility boiler FGD installations. It summarizes information contributed by the utility industry, process suppliers, regulatory agencies, and consulting engineering firms. Domestic FGD systems are tabulated alphabetically by development status (operational, under construction, or in planning stages), utility company, process supplier, process and waste disposal practice. It presents data on boiler design, FGD system design, fuel characteristics, and actual performance. It includes unit by unit dependability parameters and discusses problems and solutions associated with the boilers and FGD systems. Process flow diagrams and FGD system economic data are appended.

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Flue Gases		Stationary Sources	21B
Desulfurization		Utility Boilers	07A, 07D
Electric Utilities			
Waste Disposal			15E
Boilers			13A

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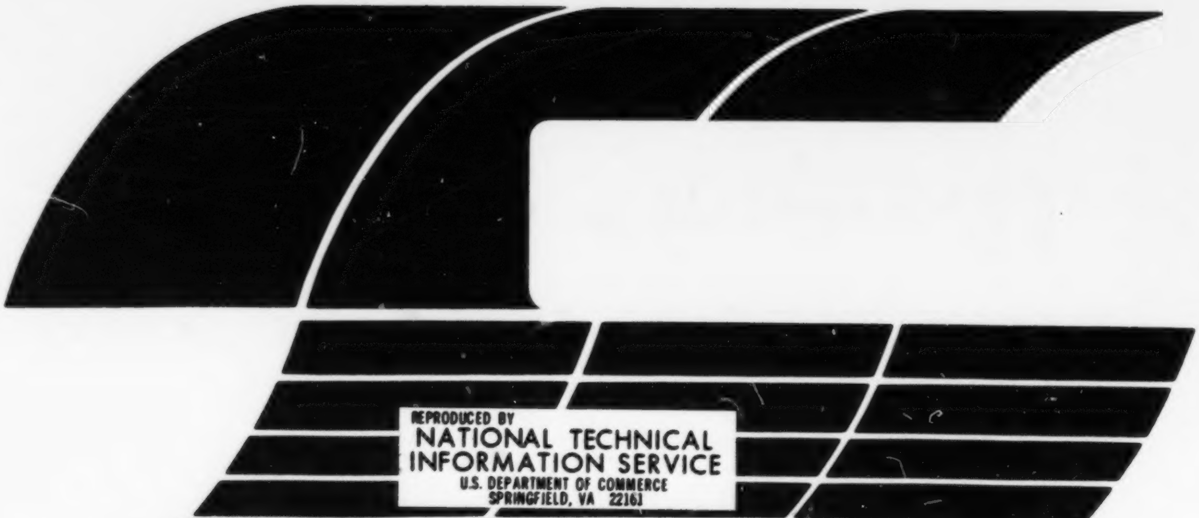

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EPA-600/7-80-029d

October 1980

EPA Utility FGD Survey:
July - September 1980

by

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Office of Enforcement
Washington, DC 20460

NOTICE

This report (prepared by PEDCo Environmental, Inc., Cincinnati, Ohio under EPA Contract No. 68-01-4147, Task No. 143) is provided as an information transfer document. Data in this report are supplied voluntarily by utility representatives; flue gas desulfurization (FGD) system designers and suppliers; regulatory personnel; and others. Neither EPA nor the designated contractor warrants the accuracy or completeness of information contained in this report.

Initial distribution of the report (generally one copy per company) is limited to organizations and individuals indicating a specific interest in the field of FGD technology. Additional copies of this report and succeeding issues can be purchased from National Technical Information Service, Springfield, Virginia 22151.

This report presents a summary of the FGD system design and performance data stored in the Flue Gas Desulfurization Information System (FGDIS), a computerized data base from which it is generated. Plans are currently being formulated to allow access to the FGDIS by private users (subject to the limitations expressed in the first paragraph above). It is anticipated that this will be implemented during the fourth quarter, 1980, at which time the service will be available to the public through the National Technical Information Service for a usage charge (nonprofit). Users will have the capability to access the additional design and performance data stored within the data base that cannot be conveniently printed in this report. In addition, users will be able to tabulate the data in a manner consistent with their specific information needs, as well as perform statistical analyses of the numerical data (e.g., average liquid to gas ratio for limestone FGD systems). When this service becomes available, the current recipients of this report will be notified; and classes will be provided on the use of the system.

USE OF THIS REPORT

This report is the third of three supplementary issues to the October - December 1979 report. Supplementary issues are cumulative, so that it is necessary to retain only the latest issue and the October - December 1979 report (EPA-600/7-80-029a).

It should be noted that along with the design and performance data for operational FGD systems contained in Section 3, this report also contains a number of tables presenting tabulations of some of the key data. The Executive Summary contains the number and capacity of FGD systems as of the end of September 1980, future projections (December 1990) of controlled and uncontrolled generating capacity, and unit by unit summaries of status changes and performance during the period.

Recent additions to this report include a section containing design and performance data for U.S. operational particle scrubbers (Section 14) and a section containing design and performance data for coal-fired operational Japanese FGD systems (Section 15). The regulatory classifications were recently modified to accomodate the revised New Source Performance Standards (6/79) and, as a result, the categories will differ slightly from those of previous issues.

Appended to this report is a section containing reported and adjusted cost data for U.S. FGD systems in which operational systems are stressed (Appendix A). Also included in the appendices are definitions, a table of unit notation, and FGD process flow diagrams.

ABSTRACT

This report is the third of three supplements updating the October - December 1979 report (EPA-600/7-80-029a) and should be used in conjunction with it. The report, which is generated by a computerized data base system, presents a survey of operational and planned domestic utility flue gas desulfurization (FGD) systems, operational domestic particle scrubbers, and Japanese coal-fired utility boiler FGD installations. It summarizes information contributed by the utility industry, process suppliers, regulatory agencies, and consulting engineering firms. It presents data on system design, fuel characteristics, operating history and actual performance. Unit by unit dependability parameters are included and problems and solutions associated with the boilers, scrubbers, and FGD systems are discussed.

The domestic FGD systems are tabulated alphabetically by development status (operational, under construction, or in the planning stages), utility company, system supplier, process, waste disposal practice, and regulatory class. FGD system economic data, definitions, and a glossary of terms are appended to the report. Current data for domestic FGD systems show 76 systems in operation, 39 systems under construction, and 93 planned systems. Projected 1990 FGD controlled capacity in the U.S. is 99,252 MW.

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EXECUTIVE SUMMARY

This report is prepared quarterly (every three months) by PEDCo Environmental, Inc., under contract to the Industrial Environmental Research Laboratory/Research Triangle Park and the Division of Stationary Source Enforcement of the U.S. Environmental Protection Agency. It is generated by a computerized data base system, the structure of which is illustrated in Figure 1.

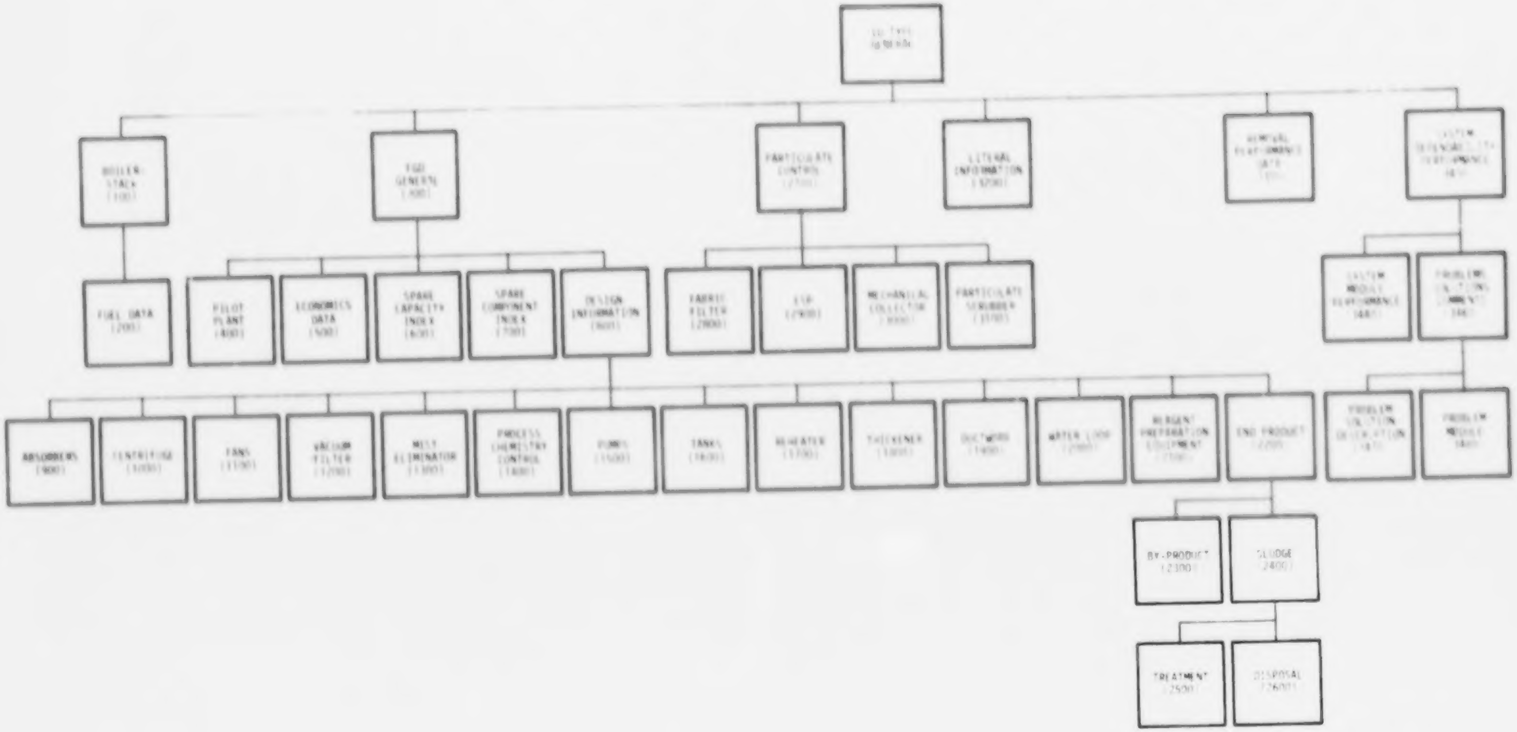
Table I summarizes the status of FGD systems in the United States at the end of September 1980. Table II lists the units that have changed status during the third quarter 1980, and Table III shows the performance of operating units during this period.

TABLE I. NUMBER AND TOTAL CAPACITY OF FGD SYSTEMS

Status	No. of units	Total controlled capacity, MW*	Equivalent scrubbed capacity, MW†
Operational	76	28,564	25,832
Under construction	39	17,155	16,442
Planned:			
Contract awarded	30	15,014	14,164
Letter of intent	7	5,590	5,590
Requesting/evaluating bids	18	9,709	9,709
Considering only FGD systems	38	23,220	23,000
TOTAL	208	99,252	94,737

* Total Controlled Capacity (TCC) is the summation of the gross unit capacities (MW) brought into compliance with FGD systems regardless of the percent of the flue gas scrubbed by the FGD system(s).

† Equivalent Scrubbed Capacity (ESC) is the summation of the effective scrubbed flue gas in equivalent MW based on the percent of flue gas scrubbed by the FGD system(s).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PROBLEM SOLUTIONS COMMENTS
PROBLEM SOLUTION DESCRIPTION
PROBLEM MODULE

Figure 1. Computerized data base structure diagram.

TABLE II. SUMMARY OF CHANGES
JULY - SEPTEMBER 1980

	Operational		Under construction		Contract awarded		Letter of intent		Requesting/ eval. bids		Considering FGD		Total	
FGD status report June 30, 1980	No. 73	MW^a 24,655^b	No. 38	MW^a 16,524	No. 29	MW^a 13,919	No. 7	MW^a 5,590	No. 15	MW^a 8,179^b	No. 38	MW^a 22,540	No. 200	MW^a 90,407^b
Atlantic City Electric Cumberland Station 1											+1	330	+1	330
Basin Electric Power Coop. Laramie River 1	+1	570	-1	570										
Big Rivers Electric D. B. Wilson 1 D. B. Wilson 2					+1 +1	440 440					-1 -1	440 440		
Central Power & Light Coleto Creek 2											+1	720	+1	720
Cooperative Power Association Coal Creek 2	+1	327	-1	327										
Deseret Gen. & Trans. Coop. Moon Lake 1					+1	410			-1	410				
Grand Haven Brd. of Light & Power J. B. Sims 3			+1	65	-1	65								
Louisville Gas & Electric Trimble County 1 Trimble County 2									+1 +1	575 575	-1 -1	575 575		
Northern States Power Sherburne 3									-1	860			-1	860
Pacific Power & Light Jim Bridger 1 Jim Bridger 2 Jim Bridger 3									+1 +1 +1	550 550 550			+1 +1 +1	550 550 550
Public Service of Indiana Gibson 5			+1	650	-1	650								
Salt River Project Coronado 2	+1	280	-1	280										
Southwestern Electric Power Dolet Hills 1 Dolet Hills 2					+1	720					+1	720	+1 +1	720 720
United Power Association Stanton 1A			+1	50	-1	50								
Utah Power & Light Naughton			+1	330									+1	330
West Texas Utilities Oklaunion 1											+1	720	+1	720
TOTAL	76	25,832	39	16,442	30	14,164	7	5,590	18	9,709	38	23,000	208	94,737

---

[a] Equivalent scrubbed capacity.

[b] This value was modified slightly due to a MW correction.

TABLE III. PERFORMANCE OF OPERATIONAL UNITS
JULY - SEPTEMBER 1980

Plant	FGD system capacity, MW^a	Flue gas % scrubbed	FGD capacity on line during period, MW^{a,b}	No information for this period, MW^a	Shutdown throughout period, MW^a	July 1980 Dependability %^{c,e}				August 1980 Dependability %^{c,e}				September 1980 Dependability %^{c,e}			
						AVL	OPR	REL	UTL	AVL	OPR	REL	UTL	AVL	OPR	REL	UTL
Tombigbee 2	179	70	179			50	49	50	27	50	42	42	9				
Tombigbee 3	179	70	179			100	68	100	59	100	94	100	74				
Apache 2	98	50	98			100	86	86	85	97	66	95	63				
Apache 3	98	50	98			29	30	90	29	99	67	95	54				
Cholla 1	119	100	119			100	99	100	99								
Cholla 2	264	100		264													
Four Corners 1	175	100		175													
Four Corners 2	175	100		175													
Four Corners 3	229	100		229													
Laramie River 1	570	100	570														
Green 1	242	100		242													
Duck Creek 1	416	100	416			88	76	85	66	91	85	91	82	46	44	46	44
Newton 1	617	100	617			2	2	2	2	54	36	40	36	99	68	83	33
Craig 2	400	87	400			67	55	56	47	67	65	67	59	78	77	79	77
Conesville 5	411	100	411			90	76	78	47	97	86	88	50	88	79	80	79
Conesville 6	411	100	411			98	87	88	85	94	76	78	55	94	90	90	89
Powerton 51	450	100	450														
Coal Creek 1	327	60	327			100	100	100	87								
Coal Creek 2	327	60	327														
Delaware City 1	60	100	60			97	97	97	91	100	100	100	100				
Delaware City 2	60	100	60			50	50	50	50	93	93	93	93				
Delaware City 3	60	100	60			95	95	95	95	73	73	73	73				
Elrama 1-4	510	100	510			100	83	98	83	100	98	100	98				
Phillips 1-6	408	100	408			95	87	95	87	92	83	92	83				
Petersburg 3	532	100		532													
Hawthorn 3	90	100	90				100		65								
Hawthorn 4	90	100	90				100		78								
La Cygne 1	820	100	820			97	96	96	77	97	96	97	70	98	91	97	54
Jeffrey 1	540	75	540			100	100	100	69	100	100	100	85	100	100	100	100
Jeffrey 2	490	70	490			100	100	100	95	100	100	100	100	100	100	100	100
Lawrence 4	125	100	125			97	97	97	97	100	100	100	100	97	100	100	40
Lawrence 5	420	100	420			100	100	100	96	100	100	100	82	100	100	100	96
Green River 1-3	64	100	64			100			0	100			0	100			0
Cane Run 4	188	100	188			86	93	93	86	100	99	99	77	100	100	100	36
Cane Run 5	200	100	200			79	88	88	79	50	58	58	50	87	98	98	87
Cane Run 6	299	100	299			100	100	100	83	99	95	95	85	99	99	100	87

(continued)

TABLE III (continued)

Plant	FGD system capacity, MW[a]	Flue gas % scrubbed	FGD capacity on line during period, MW[a,b]	No information for this period, MW[a]	Shutdown throughout period, MW[a]	July 1980 Dependability %[c,e]				August 1980 Dependability %[c,e]				September 1980 Dependability %[c,e]			
						AVL	OPR	REL	UTL	AVL	OPR	REL	UTL	AVL	OPR	REL	UTL
Mill Creek 3	442	100	442			92	91	91	84	59	82	82	59	57	60	60	57
Paddy's Run 6	72	100	72			100			0	100			0	100			0
Clay Boswell 4	475	85	475				96	100	95		76	100	66		80	100	80
Milton R. Young 2	185	42	185			65	65	66	52	99	99	99	98	100	98	100	90
Pleasants 1	618	100	618														
Colstrip 1	360	100		360													
Colstrip 2	360	100		360													
Reid Gardner 1	125	100	125			87	95	87	84	86	86	84	72	91	91	91	90
Reid Gardner 2	125	100	125			88	77	86	75	97	96	96	80	100			0
Reid Gardner 3	125	100	125			96	96	96	95	100	100	100	100	97	97	97	97
Dean H. Mitchell 11	115	100	115			100	0		0	84	66	66	31	69	53	53	45
Sherburne 1	740	100	740			100	100	100	100	100	100	100	99	100	100	100	100
Sherburne 2	740	100	740			100	100	100	83	100	100	100	100	100	100	100	100
Jim Bridger 4	550	100	550			98	83	98	80	96	85	95	78				
Bruce Mansfield 1	917	100		917													
Bruce Mansfield 2	917	100		917													
Bruce Mansfield 3	917	100		917													
San Juan 1	361	100	361			100	92		92	100	95	93	95	61	93	95	51
San Juan 2	350	100	350			98	77		68	98	85	100	81	99	56	63	52
San Juan 3	534	100	534			76	90	90	75	83	82	83	80	97	59	59	46
Coronado 1	280	80	280														
Coronado 2	280	80	280														
Winyah 2	140	50	140			100	100	100	100	98	98	98	88	97	100	100	87
Winyah 3	280	100	280			13	13	13	13	18	20	20	18	0	0	0	0
R.D. Morrow, Sr. 1	124	62	124			94	99	99	94	100	100	100	100	99	100	100	92
R.D. Morrow, Sr. 2	124	62	124			80	81	81	80	99	100	100	99	99	100	100	99
Marion 4	173	100	173			97	100	100	96	100	100	100	91	100	100	100	100
A.B. Brown 1	265	100	265			92	93	93	88	95	95	95	95	100	100	100	100
Southwest 1	194	100[d]	194			69	54	72	54	73	61	62	61	68	43	44	39
G.F. Weaton 1	60	N/A[d]	60														
Shawnee 10A	10	N/A[d]	10														
Shawnee 10B	10	N/A[d]	10														
Widows Creek 8	550	100	550			99	73	98	66								
Martin Lake 1	595	75	595														
Martin Lake 2	595	75	595														
Martin Lake 3	595	75	595														

(continued)

TABLE III (continued)

Plant	FGD system capacity, MW[a]	Flue gas % scrubbed	FGD capacity on line during period, MW[a,b]	No information for this period, MW[a]	Shutdown throughout period, MW[a]	July 1980 Dependability %[c,e]				August 1980 Dependability %[c,e]				September 1980 Dependability %[c,e]			
						AVL	OPR	REL	UTL	AVL	OPR	REL	UTL	AVL	OPR	REL	UTL
Monticello 3	800	100	800														
Hunter 1	360	90	360				100		100	100							
Hunter 2	360	90	360				100		99	100				100			
Huntington 1	366	85	366				100		87	100				0			
TOTAL			20,512	5,088	0												

[a] Equivalent scrubbed capacity.

[b] This category includes the flue gas capacity being handled by the FGD system at least part of the time during the report period.

[c] The percent figures listed are average values for all system scrubbing trains during the period.

[d] Flue gas % scrubbed for prototype and demonstration units is not applicable unless the system is designed to bring a unit into compliance with SO_2 emission standard.

[e] Availability, operability, reliability, and utilization as defined in Appendix C of this report.

As indicated in Table I, 76 power generating units (all coal-fired) are now equipped with operating FGD systems. These units represent a total controlled capacity of 28,564 MW. Current projections indicate that the total power generating capacity of the U.S. electric utility industry will be approximately 833 GW by the end of 1990.[a] (This value reflects the annual loss resulting from the retirement of older units, which is considered to be 0.4 percent of the average generating capacity at the end of each year.[b]) Approximately 370 GW or 44 percent of the 1990 total will come from coal-fired units. The distribution of power generation sources, both present (December 1979) and future (December 1990) is as follows:[a]

	Coal	Nuclear	Oil	Hydro	Gas	Other	GW (total)
December 1979	39%	9%	25%	13%	13%	1%	603
December 1990	44%	14%	20%	11%	10%	1%	833

Based on the known commitments to FGD by utilities as presented in Table I, the percentage of electrical generating capacity controlled by FGD for both the present (September 1980) and the future (December 1990) is as follows:

	Coal-fired generating capacity, %	Total generating capacity, %
September 1980*	12.1	4.7
December 1990	27.1	11.9

In light of the revised New Source Performance Standards, actual FGD control is expected to be greater than what is reflected by the figures above. For example, about 40 to 50 systems representing approximately 20,000 to 25,000 MW of generating capacity presently fall into the uncommitted category. These are systems that cannot be included in the committed group at this time because information regarding their status is not ready for public release.

In an effort to show general FGD usage and projected usage trends, the table below gives a current (September 1980) and a projected (December 1990) breakdown of throwaway product systems versus salable product systems as a percent of the total known commitments to FGD as of the end of the third quarter 1980:

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* The number of committed FGD systems is as of September 1980; however, the figure used for the total generating capacity and coal-fired generating capacity is based on the available December 1979 figures.

	Percent of total MW	
	September 1980	December 1990
Throwaway product process		
Wet systems		
Lime	39.5	21.1
Limestone	46.1	36.0
Dual alkali	4.6	2.1
Sodium carbonate	3.6	3.3
N/A[a]	-	6.7
Dry systems		
Lime	-	3.2
Sodium carbonate	-	0.5
Salable product process		
Byproduct		
Gypsum	-	2.4
Sulfur	3.4	1.1
Sulfuric acid	2.8	2.7
Process undecided	-	20.9
Total	100.0	100.0

[a] NA - Not available (these systems are committed to a throwaway product process; however, the actual process is unknown at this time).

HIGHLIGHTS: JULY - SEPTEMBER 1980

The following paragraphs highlight FGD system developments during the third quarter 1980.

Alabama Electric Cooperative reported that the Tombigbee 3 FGD system achieved availabilities of 100% for both July and August with no major mechanical problems being encountered. Operational data for the month of September are not yet available.

Atlantic City Electric has announced plans to construct Cumberland Station 1 in Millville, New Jersey. The unit will have a gross rating of 330 MW and will fire a 3.25% sulfur coal. The utility is considering only FGD for SO_2 control, although a specific process type has not been decided. Initial operations are expected to begin in January 1988.

Initial and commercial FGD operations began on July 1, 1980, at Laramie River 1 of Basin Electric Power Cooperative. This unit, which is rated at 570 MW (gross), fires a subbituminous coal with an average sulfur content of 0.81%. The FGD system, which is preceeded by a cold side ESP for primary particle control, consists of five Research Cottrell limestone packed tower modules. The design SO_2 removal efficiency of the system is 90%. The flue gas exits the system through a 600 foot acid resistant brick lined stack. No initial system start up problems have been reported.

A contract was awarded during the third quarter 1980 to Pullman Kellogg by Big Rivers Electric for the installation of two wet limestone FGD systems to control SO_2 emissions from the planned D.B. Wilson units 1 and 2. Each unit will be rated at 440 MW (gross). Currently, initial operations are scheduled to begin in 1984 and 1985 for units 1 and 2, respectively.

Central Power and Light has announced plans to construct unit 2 at its Coleto Creek station in Fannin, Texas. The unit will fire a subbituminous coal with an average sulfur content of 0.39%. Central and Southwestern Services, the holding company for Central Power and Light, will construct the unit. Only dry scrubbing is being considered as a SO_2 control strategy. Startup of the system is scheduled for September 1986.

Initial operations began at Coal Creek 2 of Cooperative Power Association during July 1980. The unit is rated at 545 MW (gross) and fires a pulverized lignite with an average sulfur content of 0.63%. The lime/alkaline flyash FGD system was supplied by Combustion Engineering and treats 60% of the flue gas before it exits through a 650 foot stack. The remaining gas is used for bypass reheat. A cold side ESP preceeds the FGD system to provide primary particle control. The sludge is stabilized with flyash before being disposed of in a clay lined pond. Operational data are not yet available from the utility.

Deseret Generation and Transmission Coop announced that a contract has been awarded to Combustion Engineering for the installation of a wet limestone FGD system on the Moon Lake 1 unit. The boiler, which will be located in Vernal, Utah, will fire coal having an average sulfur content of 0.50% and will be rated at 410 MW (gross). The FGD system will feature a fabric filter supplied by Ecolaire for primary particle control. Operations at Moon Lake 1 are scheduled to commence in September 1984.

Grand Haven Board of Light and Power announced that construction began in July 1980 on the FGD system being supplied by Babcock and Wilcox to control SO_2 emissions from the new J.B. Sims 3 unit. This unit, which is being constructed in Grand Haven, Michigan, will be rated at 65 MW (gross) and will burn coal with an average sulfur content of 2.75%. The wet lime FGD system will consist of two spray towers with an overall design SO_2 removal efficiency of 90%. Initial operations are expected to begin in June 1983.

Kansas City Power and Light reported that the La Cygne FGD system achieved availabilities of 97%, 97%, and 98% for the months of July, August, and September, respectively. No major FGD related problems were encountered during the three month period.

Kansas Power and Light reported 100% availability for the third quarter 1980 for both the Jeffrey 1 and 2 FGD systems. The only problems reported for the three month period at each unit were boiler related.

Kansas Power and Light also reported that the Lawrence 4 FGD system achieved availabilities of 97%, 100%, and 97% for the months of July, August, and September, respectively. The only major FGD related problem occurred during July when a storage tank eroded causing a two day outage. The Lawrence 5 FGD system was available 100% of the time during the third quarter, 1980 with no FGD related problems being experienced.

The dual alkali system installed on the Cane Run 6 unit of Louisville Gas and Electric achieved availabilities of 100%, 99%, and 99% for the months of July, August, and September, respectively. An acceptance test that took place during July indicated that the system was attaining a 95.1% SO_2 removal efficiency level.

Louisville Gas and Electric announced that bids for a wet scrubbing system to control SO_2 emissions from the planned Trimble County units 1 and 2 are currently being requested/evaluated. Each unit will be rated at 575 MW (gross) and will burn bituminous coal with an average sulfur content of 4.0%. ESP's will be utilized for primary particle control. Operations for units 1 and 2 are scheduled to commence in 1985 and 1988, respectively.

Northern States Power reported that the FGD systems installed on Sherburne 1 and 2 each had availabilities of 100% for the entire third quarter of 1980. The only problems reported for this period were boiler related.

Northern States Power announced during the third quarter 1980 that plans for a unit 3 at the Sherburne County station have been suspended. The utility is planning further engineering studies and is considering locating this new unit at a different site.

Pacific Power and Light is currently requesting/evaluating bids for sodium carbonate FGD systems to be retrofitted on units 1, 2, and 3 at the Jim Bridger station located in Rock Springs, Wyoming. Each boiler is rated at 550 MW (gross) and fires subbituminous coal with an average sulfur content of 0.56%. Initial FGD operations are scheduled to begin in 1988, 1984, 1986 for units 1, 2, and 3, respectively.

Construction began on the FGD system being installed at Public Service of Indiana's Gibson 5 during July 1980. The FGD system is being supplied by Pullman Kellogg and will utilize a magnesium promoted limestone process. The system will consist of four horizontal Weir absorber modules. Initial operation is scheduled to begin in 1982.

Salt River project announced that initial operations of the limestone FGD system at Coronado 2 commenced in July. The FGD system, which was supplied by Pullman Kellogg, consists of two limestone horizontal Weir absorber modules. Primary particulate matter removal is provided by two hot side ESP's. The utility reports that bearing inspection has been completed and the unit is expected to begin commercial operations in November.

South Mississippi Electric Power reported availabilities of 94%, 100%, and 99% for the R.D. Morrow, Sr. 1 FGD system during July, August, and September, respectively. During July some FGD system outage time was caused by a malfunction of the ball mill. The R.D. Morrow, Sr. 2 FGD system achieved availabilities of 80%, 99%, and 99% during the same three month period, respectively. The lower availability experienced during July was attributed to ball mill repairs.

Southern Indiana Gas and Electric reported that the A.B. Brown 1 FGD system achieved availabilities of 92%, 95%, and 100% for the months of July, August, and September, respectively. Problems with recirculation pumps and sludge disposal equipment were reported for this three month period.

Southwestern Electric Power announced that a contract has been awarded to the Air Correction Division, UOP for the installation of a wet limestone FGD system to control SO_2 emissions from unit 1 at the new Dolet Hills station. This unit is located in Mansfield, Louisiana, and will be rated at 720 MW (gross). The FGD system will be preceeded by an ESP for primary particle removal. Initial system operations are expected to begin in 1986.

Southwestern Electric Power has also announced plans for a second unit to be installed at the Dolet Hills station. Unit 2 is scheduled to become operational in 1988, and the utility is currently considering a wet limestone FGD system for SO_2 control.

United Power Association announced that the FGD system being supplied by Research-Cottrell at the Stanton station, located in Stanton, North Dakota, is now under construction. The FGD system will utilize a lime/spray drying process to control SO_2 emissions from the 50 MW (gross) boiler, followed by a fabric filter for primary particle control. Initial start up of the system is projected for June 1982.

The FGD System being retrofitted on the Naughton 3 unit of Utah Power and Light is currently under construction. This boiler, which is located in Kemmerer, Wyoming, is rated at 330 MW (gross) and fires coal with an average sulfur content of 0.55%. The FGD system is being supplied by the Air Correction Division, UOP, and will use a wet sodium carbonate process. Initial system start up is scheduled for June 1981.

West Texas Utilities announced plans during the third quarter 1980 for a new unit to be located near Oklaunion, Texas. The unit will be rated at 720 MW (gross). Currently, the utility is considering only FGD as a means for SO_2 control. Initial operations are scheduled to begin in 1987.

REFERENCES

a. U.S. Department of Energy. Energy Information Administration. Office of Coal and Electric Power Statistics. Electric Power Statistics Division. Inventory of Power Plants in the United States, December 1979. Publ. No. DOE/EIA-0095 (79).

b. Rittenhouse, R.C. New Generating Capacity: When, Where, and by Whom. Power Engineering 82(4):57. April 1978.

SECTION 1
SUMMARY LIST OF FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
ALABAMA ELECTRIC COOP						
TOMBIGBEE	2	LEROY	ALABAMA	9/78	1	B
TOMBIGBEE	3	LEROY	ALABAMA	6/79	1	B
ARIZONA ELECTRIC POWER COOP						
APACHE	2	COCHISE	ARIZONA	8/78	1	D
APACHE	3	COCHISE	ARIZONA	6/79	1	D
ARIZONA PUBLIC SERVICE						
CHOLLA	1	JOSEPH CITY	ARIZONA	10/73	1	C
CHOLLA	2	JOSEPH CITY	ARIZONA	4/78	1	C
CHOLLA	4	JOSEPH CITY	ARIZONA	6/81	2	C
FOUR CORNERS	1	FARMINGTON	NEW MEXICO	11/79	1	C
FOUR CORNERS	2	FARMINGTON	NEW MEXICO	11/79	1	C
FOUR CORNERS	3	FARMINGTON	NEW MEXICO	11/79	1	C
FOUR CORNERS	4	FARMINGTON	NEW MEXICO	0/82	3	C
FOUR CORNERS	5	FARMINGTON	NEW MEXICO	0/82	3	C
ASSOCIATED ELECTRIC COOP						
THOMAS HILL	3	MOBERLY	MISSOURI	1/82	2	A
ATLANTIC CITY ELECTRIC						
CUMBERLAND	1	MILLVILLE	NEW JERSEY	1/88	6	C
BASIN ELECTRIC POWER COOP						
ANTELOPE VALLEY	1	BEULAH	NORTH DAKOTA	4/83	2	D
ANTELOPE VALLEY	2	BEULAH	NORTH DAKOTA	10/85	5	C
LARAMIE RIVER	1	WHEATLAND	WYOMING	7/80	1	C
LARAMIE RIVER	2	WHEATLAND	WYOMING	6/81	2	C
LARAMIE RIVER	3	WHEATLAND	WYOMING	4/82	2	C
BIG RIVERS ELECTRIC						
D.B. WILSON	1			7/84	3	A
D.B. WILSON	2			1/86	3	A
GREEN	1	SEBREE	KENTUCKY	12/79	1	B
GREEN	2	SEBREE	KENTUCKY	11/80	2	B
CAJUN ELECTRIC POWER COOP						
BIG CAJUN III	1	DE SOTO PARISH	LOUISIANA	0/85	6	A
CENTRAL ILLINOIS LIGHT						
DUCK CREEK	1	CANTON	ILLINOIS	7/76	1	B
DUCK CREEK	2	CANTON	ILLINOIS	1/86	5	A
CENTRAL ILLINOIS PUBLIC SERV						
NEWTON	1	NEWTON	ILLINOIS	9/79	1	B
CENTRAL ILLINOIS PUBLIC SERVIC						
NEWTON	2	NEWTON	ILLINOIS	12/82	7	A
CENTRAL MAINE POWER						
SEARS ISLAND	1	PENOBSCOT BAY	MAINE	1/89	6	A
CENTRAL POWER & LIGHT						
COLETO CREEK	2	FANNIN	TEXAS	9/86	6	A
CINCINNATI GAS & ELECTRIC						
EAST BEND	1	RABBITHASH	KENTUCKY	10/87	6	
EAST BEND	2	RABBITHASH	KENTUCKY	12/80	2	B

1. OPERATIONAL UNITS
2. UNITS UNDER CONSTRUCTION
3. PLANNED - CONTRACT AWARDED
4. PLANNED - LETTER OF INTENT SIGNED
5. PLANNED - REQUESTING/EVALUATING BIDS
6. PLANNED - CONSIDERING ONLY FGD SYSTEMS
7. PLANNED - CONSIDERING FGD SYSTEMS; ALSO ALTERNATIVE METHODS

A. FEDERAL NSPS(6/79)
B. FEDERAL NSPS(12/71)
C. STANDARD(S) MORE STRINGENT THAN NSPS(6/79)
D. STANDARD(S) MORE STRINGENT THAN NSPS(12/71) BUT NOT MORE STRINGENT THAN NSPS(6/79)
E. STANDARD(S) EQUAL TO OR LESS STRINGENT THAN NSPS(12/71)

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COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
COLORADO UTE ELECTRIC ASSN						
CRAIG	1	CRAIG	COLORADO	10/80	2	D
CRAIG	2	CRAIG	COLORADO	12/79	1	D
CRAIG	3	CRAIG	COLORADO	0/82	3	D
COLUMBUS & SOUTHERN OHIO ELEC						
CONESVILLE	5	CONESVILLE	OHIO	1/77	1	D
CONESVILLE	6	CONESVILLE	OHIO	6/78	1	D
POSTON	5	NELSONVILLE	OHIO	8/86	6	D
POSTON	6	NELSONVILLE	OHIO	0/89	6	D
COMMONWEALTH EDISON						
POWERTON	51	PEKIN	ILLINOIS	4/80	1	E
COOPERATIVE POWER ASSOCIATION						
COAL CREEK	1	UNDERWOOD	NORTH DAKOTA	7/79	1	B
COAL CREEK	2	UNDERWOOD	NORTH DAKOTA	7/80	1	B
DELMARVA POWER & LIGHT						
DELAWARE CITY	1	DELAWARE CITY	DELAWARE	5/80	1	E
DELAWARE CITY	2	DELAWARE CITY	DELAWARE	5/80	1	E
DELAWARE CITY	3	DELAWARE CITY	DELAWARE	5/80	1	E
VIENNA	9	VIENNA	MARYLAND	6/87	6	A
DESERET GEN & TRANS COOP						
MOON LAKE	1	VERNAL	UTAH	9/84	3	A
MOON LAKE	2	VERNAL	UTAH	0/88	5	A
DUQUESNE LIGHT						
ELRAMA	1-4	ELRAMA	PENNSYLVANIA	10/75	1	D
PHILLIPS	1-6	SOUTH HEIGHT	PENNSYLVANIA	7/73	1	D
EAST KENTUCKY POWER COOP						
J.K. SMITH	1			1/85	6	A
J.K. SMITH	2			1/87	6	A
SPURLOCK	2	MAYSVILLE	KENTUCKY	1/81	2	B
FLORIDA POWER & LIGHT						
MARTIN	3	MARTIN COUNTY	FLORIDA	0/87	7	A
MARTIN	4	MARTIN COUNTY	FLORIDA	0/89	7	A
GENERAL PUBLIC UTILITIES						
COAL	1	UNDECIDED	UNDECIDED	12/92	6	A
COAL	2	UNDECIDED	UNDECIDED	5/94	6	A
COAL	3	UNDECIDED	UNDECIDED	12/95	6	A
COAL	4	UNDECIDED	UNDECIDED	5/97	6	A
COHO	1	GIRARD	PENNSYLVANIA	5/91	5	A
SEWARD	7	EAST WHEATFIELD	PENNSYLVANIA	5/87	5	A
GRAND HAVEN BRD OF LIGHT & PWR						
J.B. SIMS	3	GRAND HAVEN	MICHIGAN	6/83	2	A
HOOSIER ENERGY						
MEROM	1	SULLIVAN	INDIANA	5/82	2	B
MEROM	2	SULLIVAN	INDIANA	9/81	2	B
HOUSTON LIGHTING & POWER						
LIMESTONE	1	JEWITT	TEXAS	12/84	5	A
LIMESTONE	2	JEWITT	TEXAS	12/85	5	A
W.A. PARISH	8	BOOTH	TEXAS	11/82	2	A

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COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
INDIANAPOLIS POWER & LIGHT						
PATRIOT	1	PATRIOT	INDIANA	0/87	6	C
PATRIOT	2	PATRIOT	INDIANA	0/ 0	6	C
PATRIOT	3	PATRIOT	INDIANA	0/ 0	6	C
PETERSBURG	3	PETERSBURG	INDIANA	12/77	1	B
PETERSBURG	4	PETERSBURG	INDIANA	10/84	2	B
IOWA ELECTRIC LIGHT & PWR		/				
GUTHRIE CO.	1	PANORA	IOWA	11/84	5	A
JACKSONVILLE ELEC AUTHORITY						
NEW PROJECT	1	EAST PORT SITE	FLORIDA	12/85	6	A
NEW PROJECT	2	EAST PORT SITE	FLORIDA	6/87	6	A
KANSAS CITY POWER & LIGHT						
HAWTHORN	3	KANSAS CITY	MISSOURI	11/72	1	D
HAWTHORN	4	KANSAS CITY	MISSOURI	8/72	1	D
LA CYGNE	1	LA CYGNE	KANSAS	2/73	1	E
KANSAS POWER & LIGHT						
JEFFREY	1	WAMEGO	KANSAS	8/78	1	D
JEFFREY	2	WAMEGO	KANSAS	4/80	1	D
LAWRENCE	4	LAWRENCE	KANSAS	1/76	1	D
LAWRENCE	5	LAWRENCE	KANSAS	11/71	1	D
KENTUCKY UTILITIES						
GREEN RIVER	1-3	CENTRAL CITY	KENTUCKY	9/75	1	E
LAKELAND UTILITIES						
MCINTOSH	3	LAKELAND	FLORIDA	8/81	2	A
LANSING BOARD OF WATER & LIGHT						
ERICKSON	2	DELTA TOWNSHIP	MICHIGAN	1/87	6	C
LOS ANGELES DEPT OF WTR & PWR						
INTERMOUNTAIN	1	DELTA	UTAH	0/86	6	A
INTERMOUNTAIN	2	DELTA	UTAH	0/87	6	A
INTERMOUNTAIN	3	DELTA	UTAH	0/88	6	A
INTERMOUNTAIN	4	DELTA	UTAH	0/89	6	A
LOUISVILLE GAS & ELECTRIC						
CANE RUN	4	LOUISVILLE	KENTUCKY	8/76	1	D
CANE RUN	5	LOUISVILLE	KENTUCKY	12/77	1	D
CANE RUN	6	LOUISVILLE	KENTUCKY	4/79	1	D
MILL CREEK	1	LOUISVILLE	KENTUCKY	1/81	2	E
MILL CREEK	2	LOUISVILLE	KENTUCKY	12/81	2	E
MILL CREEK	3	LOUISVILLE	KENTUCKY	8/78	1	D
MILL CREEK	4	LOUISVILLE	KENTUCKY	6/82	2	B
PADDY'S RUN	6	LOUISVILLE	KENTUCKY	4/73	1	E
TRIMBLE COUNTY	1	BEDFORD	KENTUCKY	7/85	5	A
TRIMBLE COUNTY	2	BEDFORD	KENTUCKY	7/88	5	A
MARQUETTE BOARD OF LIGHT & PWR						
SHIRAS	3	MARQUETTE	MICHIGAN	10/82	5	A
MICHIGAN SO CENTRAL PWR AGENCY						
PROJECT	1	LITCHFIELD	MICHIGAN	6/82	3	A
MIDDLE SOUTH UTILITIES						
ARKANSAS LIGNITE	5		ARKANSAS	0/90	4	A
ARKANSAS LIGNITE	6		ARKANSAS	0/92	4	A

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COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
MIDDLE SOUTH UTILITIES						
UNASSIGNED	1		LOUISIANA	0/89	4	A
UNASSIGNED	2		LOUISIANA	0/93	4	A
WILTON	1	CONVENT	LOUISIANA	0/88	4	A
WILTON	2	CONVENT	LOUISIANA	0/91	4	A
MINNESOTA POWER & LIGHT						
CLAY BOSWELL	4	COHASSET	MINNESOTA	4/80	1	B
MINNKOTA POWER COOPERATIVE						
MILTON R. YOUNG	2	CENTER	NORTH DAKOTA	9/77	1	D
MONONGAHELA POWER						
PLEASANTS	1	BELMONT	WEST VIRGINIA	3/79	1	B
PLEASANTS	2	BELMONT	WEST VIRGINIA	10/80	2	B
MONTANA POWER						
COLSTRIP	1	COLSTRIP	MONTANA	9/75	1	B
COLSTRIP	2	COLSTRIP	MONTANA	5/76	1	B
COLSTRIP	3	COLSTRIP	MONTANA	5/83	2	C
COLSTRIP	4	COLSTRIP	MONTANA	3/84	2	C
MONTANA-DAKOTA UTILITIES						
COYOTE	1	BEULAH	NORTH DAKOTA	3/81	2	E
MUSCATINE POWER & WATER						
MUSCATINE	9	MUSCATINE	IOWA	9/82	3	B
NEBRASKA PUBLIC POWER DISTRICT						
FOSSIL III	1	SARGENT	NEBRASKA	3/87	6	A
NEVADA POWER						
HARRY ALLEN	1	LAS VEGAS	NEVADA	6/86	6	A
HARRY ALLEN	2	LAS VEGAS	NEVADA	6/87	6	A
HARRY ALLEN	3	LAS VEGAS	NEVADA	6/88	6	A
HARRY ALLEN	4	LAS VEGAS	NEVADA	6/89	6	A
REID GARDNER	1	MOAPA	NEVADA	3/74	1	B
REID GARDNER	2	MOAPA	NEVADA	4/74	1	B
REID GARDNER	3	MOAPA	NEVADA	6/76	1	B
REID GARDNER	4	MOAPA	NEVADA	4/83	4	A
WARNER VALLEY	1	ST. GEORGE	UTAH	6/85	5	A
WARNER VALLEY	2	ST. GEORGE	UTAH	6/86	5	A
NEW YORK STATE ELEC & GAS						
SOMERSET	1	SOMERSET	NEW YORK	6/84	5	E
NIAGARA MOHAWK POWER COOP						
CHARLES R. HUNTLEY	66	BUFFALO	NEW YORK	4/82	2	E
NORTHERN INDIANA PUB SERVICE						
DEAN H. MITCHELL	11	GARY	INDIANA	7/76	1	E
SCHAHFER	17	WHEATFIELD	INDIANA	6/83	3	A
SCHAHFER	18	WHEATFIELD	INDIANA	6/85	3	A
NORTHERN STATES POWER						
RIVERSIDE	6,7	MINNEAPOLIS	MINNESOTA	11/80	2	E
SHERBURNE	1	BECKER	MINNESOTA	3/76	1	D
SHERBURNE	2	BECKER	MINNESOTA	3/77	1	D

1. OPERATIONAL UNITS
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3. PLANNED - CONTRACT AWARDED
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6. PLANNED - CONSIDERING ONLY FGD SYSTEMS
7. PLANNED - CONSIDERING FGD SYSTEMS; ALSO ALTERNATIVE METHODS

A. FEDERAL NSPS(6/79)
B. FEDERAL NSPS(12/71)
C. STANDARD(S) MORE STRINGENT THAN NSPS(6/79)
D. STANDARD(S) MORE STRINGENT THAN NSPS(12/71) BUT NOT MORE STRINGENT THAN NSPS(6/79)
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SECTION 1
SUMMARY LIST OF FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	UNIT LOCATION		START-UP DATE	STATUS	REG CLASS
PACIFIC GAS & ELECTRIC						
MONTEZUMA	1	COLLINSVILLE	CALIFORNIA	6/89	6	C
MONTEZUMA	2	COLLINSVILLE	CALIFORNIA	6/90	6	C
PACIFIC POWER & LIGHT						
JIM BRIDGER	1	ROCK SPRINGS	WYOMING	0/88	5	A
JIM BRIDGER	2	ROCK SPRINGS	WYOMING	0/84	5	A
JIM BRIDGER	3	ROCK SPRINGS	WYOMING	0/86	5	A
JIM BRIDGER	4	ROCK SPRINGS	WYOMING	9/79	1	D
PENNSYLVANIA POWER						
BRUCE MANSFIELD	1	SHIPPINGPORT	PENNSYLVANIA	12/75	1	D
BRUCE MANSFIELD	2	SHIPPINGPORT	PENNSYLVANIA	7/77	1	D
BRUCE MANSFIELD	3	SHIPPINGPORT	PENNSYLVANIA	6/80	1	D
PHILADELPHIA ELECTRIC						
CROMBY	1	PHOENIXVILLE	PENNSYLVANIA	5/83	3	D
EDDYSTONE	1	EDDYSTONE	PENNSYLVANIA	12/82	2	D
EDDYSTONE	2	EDDYSTONE	PENNSYLVANIA	12/82	2	D
PLAINS ELECTRIC G & T COOP						
PLAINS ESCALANTE	1	PREWITT	NEW MEXICO	12/83	3	B
PLATTE RIVER POWER AUTHORITY						
RAWHIDE	1	FT. COLLINS	COLORADO	12/83	3	C
PUBLIC SERVICE INDIANA						
GIBSON	5	PRINCETON	INDIANA	0/82	2	B
PUBLIC SERVICE OF NEW MEXICO						
SAN JUAN	1	WATERFLOW	NEW MEXICO	4/78	1	C
SAN JUAN	2	WATERFLOW	NEW MEXICO	8/78	1	C
SAN JUAN	3	WATERFLOW	NEW MEXICO	12/79	1	C
SAN JUAN	4	WATERFLOW	NEW MEXICO	6/82	2	C
PWR AUTHORITY OF STATE OF NY						
FOSSIL		NEW YORK	NEW YORK	4/87	6	C
SALT RIVER PROJECT						
CORONADO	1	ST. JOHNS	ARIZONA	11/79	1	D
CORONADO	2	ST. JOHNS	ARIZONA	7/80	1	D
CORONADO	3	ST. JOHNS	ARIZONA	0/89	6	A
SAN MIGUEL ELECTRIC COOP						
SAN MIGUEL	1	SAN MIGUEL	TEXAS	11/80	2	B
SEMINOLE ELECTRIC						
SEMINOLE	1	PALATKA	FLORIDA	3/83	3	A
SEMINOLE	2	PALATKA	FLORIDA	3/85	3	A
SIERRA PACIFIC POWER						
VALMY	2	VALMY	NEVADA	8/84	7	A
SIKESTON BRD OF MUNICIPAL UTIL						
SIKESTON	1	SIKESTON	MISSOURI	3/81	2	B
SOUTH CAROLINA PUBLIC SERVICE						
CROSS	1	CROSS	SOUTH CAROLINA	3/85	3	A
CROSS	2	CROSS	SOUTH CAROLINA	11/83	3	A
WINYAH	2	GEORGETOWN	SOUTH CAROLINA	7/77	1	B
WINYAH	3	GEORGETOWN	SOUTH CAROLINA	5/80	1	B

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SECTION 1
SUMMARY LIST OF FGD SYSTEMS

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SOUTH CAROLINA PUBLIC SERVICE						
WINYAH	4	GEORGETOWN	SOUTH CAROLINA	7/81	2	A
SOUTH MISSISSIPPI ELEC PWR						
R.D. MORROW, SR.	1	HATTISBURG	MISSISSIPPI	8/78	1	B
R.D. MORROW, SR.	2	HATTISBURG	MISSISSIPPI	6/79	1	B
SOUTHERN ILLINOIS POWER COOP						
MARION	4	MARION	ILLINOIS	5/79	1	B
MARION	5	MARION	ILLINOIS	0/88	6	A
SOUTHERN INDIANA GAS & ELEC						
A.B. BROWN	1	WEST FRANKLIN	INDIANA	3/79	1	B
SOUTHWESTERN ELECTRIC POWER						
DOLET HILLS	1	MANSFIELD	LOUISIANA	0/86	3	A
DOLET HILLS	2	MANSFIELD	LOUISIANA	0/88	6	A
HENRY W. PIRKEY	1	HALLSVILLE	TEXAS	12/84	3	B
SPRINGFIELD CITY UTILITIES						
SOUTHWEST	1	SPRINGFIELD	MISSOURI	4/77	1	B
SPRINGFIELD WATER, LIGHT & PWR						
DALLMAN	3	SPRINGFIELD	ILLINOIS	10/80	2	B
ST. JOE ZINC						
G.F. WEATON	1	MONACA	PENNSYLVANIA	11/79	1	B
SUNFLOWER ELECTRIC COOP						
HOLCOMB	1	HOLCOMB	KANSAS	9/83	3	A
TAMPA ELECTRIC						
BIG BEND	4	TAMPA	FLORIDA	12/84	3	A
TENNESSEE VALLEY AUTHORITY						
JOHNSONVILLE	1-10	NEW JOHNSONVILL	TENNESSEE	12/81	3	E
PARADISE	1	PARADISE	KENTUCKY	3/82	2	E
PARADISE	2	PARADISE	KENTUCKY	6/82	2	E
SHAWNEE	10A	PADUCAH	KENTUCKY	4/72	1	E
SHAWNEE	10B	PADUCAH	KENTUCKY	4/72	1	E
WIDOWS CREEK	7	BRIDGEPORT	ALABAMA	9/81	2	E
WIDOWS CREEK	8	BRIDGEPORT	ALABAMA	5/77	1	E
TEXAS MUNICIPAL POWER AGENCY						
GIBBONS CREEK	1	CARLOS	TEXAS	1/82	2	A
TEXAS POWER & LIGHT						
SANDOW	4	ROCKDALE	TEXAS	11/80	2	B
TWIN OAKS	1	BREMOND	TEXAS	8/84	3	A
TWIN OAKS	2	BREMOND	TEXAS	8/85	3	A
TEXAS UTILITIES						
FOREST GROVE	1	ATHENS	TEXAS	0/87	5	A
MARTIN LAKE	1	TATUM	TEXAS	4/77	1	B
MARTIN LAKE	2	TATUM	TEXAS	5/78	1	B
MARTIN LAKE	3	TATUM	TEXAS	2/79	1	B
MARTIN LAKE	4	TATUM	TEXAS	0/85	3	A
MILL CREEK	1	HENDERSON	TEXAS	0/85	6	A
MILL CREEK	2	HENDERSON	TEXAS	0/86	6	A
MONTICELLO	3	MT. PLEASANT	TEXAS	5/78	1	B

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TUCSON ELECTRIC POWER						
SPRINGERVILLE	1	SPRINGERVILLE	ARIZONA	1/85	3	B
SPRINGERVILLE	2	SPRINGERVILLE	ARIZONA	3/87	3	B
UNITED POWER ASSOCIATION						
STANTON	1A	STANTON	NORTH DAKOTA	6/82	2	A
UTAH POWER & LIGHT						
HUNTER	1	CASTLE DALE	UTAH	5/79	1	D
HUNTER	2	CASTLE DALE	UTAH	6/80	1	D
HUNTER	3	CASTLE DALE	UTAH	6/83	3	A
HUNTER	4	CASTLE DALE	UTAH	6/85	3	A
HUNTINGTON	1	PRICE	UTAH	5/78	1	B
NAUGHTON	3	KEMMERER	WYOMING	6/81	2	C
WEST PENN POWER						
MITCHELL	33	COURTNEY	PENNSYLVANIA	8/82	3	C
WEST TEXAS UTILITIES						
OKLAUNION	1	OKLAUNION	TEXAS	12/86	6	A

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SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
ALABAMA ELECTRIC COOP TOMBIGBEE 2 NEW 255.0 MW (GROSS) 179.0 MW (ESC) COAL 1.15 %S BITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 3.1% STATUS 1 STARTUP 9/78	TOMBIGBEE 2 OF ALABAMA ELECTRIC COOP IS A PULVERIZED COAL BOILER LOCATED IN LEROY, ALABAMA. THE BOILER GENERATES A MAXIMUM FLUE GAS FLOW OF 953,000 ACFM AND BURNS BITUMINOUS COAL WITH AN AVERAGE SULFUR CONTENT OF 1.15% AND AN AVERAGE HEAT CONTENT OF 11,500 BTU/LB. THE UNIT SO2 EMMISSION LIMITATION VALUE IS 1.2 LB/MMBTU. PRIMARY PARTICULATE MATTER CONTROL IS PROVIDED BY A HOT SIDE ESP. THE SO2 REMOVAL EQUIPMENT CONSISTS OF TWO SPRAY TOWERS SUPPLIED BY PEABODY PROCESS SYSTEMS WHICH UTILIZE A LIMESTONE REAGENT. A CHEVRON MIST ELIMINATOR IS INCLUDED FOR EACH TOWER AND THE FLUE GAS IS REHEATED WITH BYPASSED GAS BEFORE BEING VENTED TO A 400 FOOT ACID-BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE AND SPENT ABSORBENT IS DISPOSED OF IN AN ON-SITE LINED POND.
ALABAMA ELECTRIC COOP TOMBIGBEE 3 NEW 255.0 MW (GROSS) 179.0 MW (ESC) COAL 1.15 %S BITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 3.1% STATUS 1 STARTUP 6/79	TOMBIGBEE 3 OF ALABAMA ELECTRIC COOP IS A PULVERIZED COAL BOILER LOCATED IN LEROY, ALABAMA. THE BOILER GENERATES A MAXIMUM FLUE GAS FLOW OF 953,000 ACFM AND BURNS BITUMINOUS COAL WITH AN AVERAGE SULFUR CONTENT OF 1.15% AND AN AVERAGE HEAT CONTENT OF 11,500 BTU/LB. THE UNIT SO2 EMISSION LIMITATION VALUE IS 1.2 LB/MMBTU. PRIMARY PARTICULATE CONTROL IS PROVIDED BY A HOT SIDE ESP. THE SO2 REMOVAL EQUIPMENT CONSISTS OF TWO SPRAY TOWERS SUPPLIED BY PEABODY PROCESS SYSTEMS WHICH UTILIZE A LIMESTONE REAGENT. A CHEVRON MIST ELIMINATOR IS INCLUDED IN EACH TOWER, AND THE FLUE GAS IS REHEATED WITH BYPASSED GAS BEFORE BEING VENTED TO A 400 FOOT ACID BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE, AND SPENT ABSORBENT IS DISPOSED IN AN ON-SITE LINED POND.
ARIZONA ELECTRIC POWER COOP APACHE 2 NEW 195.0 MW (GROSS) 98.0 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 4.1% STATUS 1 STARTUP 8/78	APACHE 2 OF ARIZONA ELECTRIC POWER COOP IS LOCATED IN COCHISE, ARIZONA AND IS A DRY BOTTOM PULVERIZED COAL FIRED UNIT WITH A FLUE GAS FLOW OF 735,000 ACFM. BITUMINOUS COAL WITH A HEATING VALUE OF 10,000 BTU/LB, A SULFUR CONTENT OF 0.55% AND AN ASH CONTENT OF 15% IS THE FUEL USED FOR THIS UNIT. PARTICULATE CONTROL IS EFFECTED BY A HOT SIDE ESP. HALF THE FLUE GAS PASSES THROUGH TWO PACKED TOWERS EMPLOYING LIMESTONE ABSORBENT AND HAVING A DESIGN SO2 REMOVAL OF 85% WERE SUPPLIED BY RESEARCH-COTTRELL. MIST ELIMINATION IS PROVIDED BY CHEVRON TYPE ELIMINATORS. NO REHEAT IS EMPLOYED. A 400 FT COLE BRAND CXL2000 LINED STACK IS IN USE. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE AND WASTE MATERIAL IS DISPOSED OF IN OFF-SITE SLUDGE PONDS. OPERATIONS COMMENCED IN AUGUST 1978.
ARIZONA ELECTRIC POWER COOP APACHE 3 NEW 195.0 MW (GROSS) 98.0 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 4.1% STATUS 1 STARTUP 6/79	APACHE 3 OF ARIZONA ELECTRIC POWER COOP IS A DRY BOTTOM, PULVERIZED COAL FIRED UNIT IN COCHISE, ARIZONA. LOW (0.55%) SULFUR BITUMINOUS COAL WITH AN AVERAGE HEATING VALUE OF 10,000 BTU/LB PRODUCES A MAXIMUM FLUE GAS FLOW OF 735,000 ACFM. HALF OF THE FLUE GAS PASSES THROUGH A HOT SIDE ESP TO TWO RESEARCH COTTRELL PACKED TOWERS, WHERE LIMESTONE IS USED TO REMOVE 85% OF THE SO2. THE GAS EXITS A HORIZONTAL CHEVRON MIST ELIMINATOR INTO ITS OWN CEILCOTE LINED FLUE IN THE 400 FOOT STACK IT SHARES WITH UNIT 2. THE FGD, WHICH HAS BEEN OPERATIONAL SINCE JUNE OF 1979, USES NO REHEAT. THE SYSTEM OPERATES IN AN OPEN WATER LOOP AND SLUDGE IS DISPOSED OF IN TWO OFF SITE LINED PONDS WITH 20 YEARS' EXPECTED LIFESPAN. TWO ADDITIONAL PONDS ARE PLANNED, WHICH WOULD ADD ANOTHER 20 YEARS' CAPACITY.
ARIZONA PUBLIC SERVICE CHOLLA 1 RETROFIT 119.0 MW (GROSS) 119.0 MW (ESC) COAL .50 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 3.4% STATUS 1 STARTUP 10/73	ARIZONA PUBLIC SERVICE'S CHOLLA 1 IS LOCATED IN JOSEPH CITY, ARIZONA AND IS A TANGENTIALLY FIRED, WET BOTTOM PULVERIZED COAL UNIT. IT IS FUELED BY BITUMINOUS COAL THAT HAS A SULFUR CONTENT OF 0.5% AND A HEATING VALUE OF 10,150 BTU/LB. PARTICULATE MATTER IS CONTROLLED BY TWO FLOODED DISC SCRUBBERS. THE FGD SYSTEM BEGAN IN OCTOBER, 1973 AND IS NOW OPERATIONAL. SO2 IS CONTROLLED BY ONE TOWER WITH MUNTERS PACKING EMPLOYING A LIMESTONE ABSORBENT. THE UNIT WAS SUPPLIED BY RESEARCH COTTRELL AND HAS A DESIGN REMOVAL OF 92%. CHEVRON MIST ELIMINATORS ARE LOCATED PRIOR TO AN IN-LINE STEAM REHEAT SYSTEM. THE TREATED FLUE GAS IS VENTED TO A 256 FT ACID BRICK LINED STACK. THE FGD SYSTEM OPERATES IN AN OPEN WATER LOOP MODE AND THE UNTREATED WASTE IS DISPOSED OF IN AN ON-SITE UNLINED POND.
ARIZONA PUBLIC SERVICE CHOLLA 2 NEW 264.0 MW (GROSS) 264.0 MW (ESC) COAL .50 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/78	CHOLLA 2 OF ARIZONA PUBLIC SERVICE IS LOCATED IN JOSEPH CITY, ARIZONA. THE BOILER BURNS PULVERIZED BITUMINOUS COAL (0.5% S, 10,150 BTU/LB). MECHANICAL COLLECTORS PROVIDE PRIMARY PARTICULATE CONTROL. FOUR PARALLEL FLOODED DISC AND PACKED TOWER SO2 ABSORBER TRAINS (THREE ARE REQUIRED FOR FULL LOAD) REMOVE THE FLUE GAS SO2. THE DESIGN SO2 REMOVAL FOR THE SYSTEM, WHICH BEGAN OPERATIONS IN APRIL, 1978, IS 75%. THE CLEANED GAS PASSES THROUGH AN IN-LINE STEAM REHEATER INTO AN ACID BRICK LINED STACK. THE OPEN WATER LOOP SYSTEM DEPOSITS ITS SLUDGE INTO A FLY ASH POND.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
ARIZONA PUBLIC SERVICE CHOLLA 4 NEW 375.0 MW (GROSS) 126.0 MW (ESC) COAL .50 %S LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/81	CHOLLA 4 OF ARIZONA PUBLIC SERVICE IS PRESENTLY UNDER CONSTRUCTION IN JOSEPH CITY, ARIZONA. THE PULVERIZED COAL (0.5% S, 10,150 BTU/LB) FIRED BOILER WILL EXHAUST FLUE GAS THROUGH AN ESP TO A DOUBLE LOOP COMBINATION TOWER (RESEARCH-COTTRELL DESIGN) WHICH WILL TREAT 36% OF THE GAS WITH LIMESTONE. THE SYSTEM IS SCHEDULED TO START UP IN JUNE 1981.
ARIZONA PUBLIC SERVICE FOUR CORNERS 1 RETROFIT 175.0 MW (GROSS) 175.0 MW (ESC) COAL .75 %S SUBBITUMINOUS LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	ARIZONA PUBLIC SERVICE HAS UPGRADED THE OPERATIONAL PARTICULATE SCRUBBERS AT FOUR CORNERS 1, 2, AND 3 IN FARMINGTON, NEW MEXICO TO HANDLE ADDITIONAL SO2 REMOVAL. INITIALLY, THE FRONT FIRED, DRY BOTTOM, PULVERIZED COAL (SUBBITUMINOUS, 0.75% S, 8650 BTU/LB) UNITS 1 AND 2 SUPPLY 814,000 ACFM EACH INTO 2 CHEMICO VENTURI SCRUBBERS PER UNIT FOR PRIMARY PARTICULATE CONTROL AND APPROXIMATELY 30% SO2 REMOVAL USING ALKALINE FLY ASH. THE DESIGN SO2 REMOVAL EFFICIENCY SINCE THE CONVERSION TO LIME AND ALKALINE FLY ASH SCRUBBING IS 67.5%. OPERATIONS COMMENCED IN NOVEMBER, 1979.
ARIZONA PUBLIC SERVICE FOUR CORNERS 2 RETROFIT 175.0 MW (GROSS) 175.0 MW (ESC) COAL .75 %S SUBBITUMINOUS LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	ARIZONA PUBLIC SERVICE HAS UPGRADED THE OPERATIONAL PARTICULATE SCRUBBERS AT FOUR CORNERS 1,2, AND 3 IN FARMINGTON, NEW MEXICO TO HANDLE ADDITIONAL SO2 REMOVAL. INITIALLY, THE FRONT FIRED, DRY BOTTOM, PULVERIZED COAL (SUBBITUMINOUS, 0.75% S, 8650 BTU/LB) UNITS 1 AND 2 SUPPLY 814,000 ACFM EACH INTO 2 CHEMICO VENTURI SCRUBBERS PER UNIT FOR PRIMARY PARTICULATE CONTROL AND APPROXIMATELY 30% SO2 REMOVAL USING ALKALINE FLY ASH. THE DESIGN SO2 REMOVAL EFFICIENCY SINCE THE CONVERSION TO LIME AND ALKALINE FLY ASH SCRUBBING IS 67.5%. OPERATIONS COMMENCED IN NOVEMBER, 1979.
ARIZONA PUBLIC SERVICE FOUR CORNERS 3 RETROFIT 229.0 MW (GROSS) 229.0 MW (ESC) COAL .75 %S SUBBITUMINOUS LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	ARIZONA PUBLIC SERVICE HAS UPGRADED THE OPERATIONAL PARTICULATE SCRUBBERS AT FOUR CORNERS 1,2, AND 3 IN FARMINGTON, NEW MEXICO TO HANDLE ADDITIONAL SO2 REMOVAL. INITIALLY, THE FRONT FIRED, DRY BOTTOM, PULVERIZED COAL (SUBBITUMINOUS, 0.75% S, 8650 BTU/LB) UNIT 3 SUPPLIES 1,030,000 ACFM INTO 2 CHEMICO VENTURI SCRUBBERS FOR PRIMARY PARTICULATE CONTROL AND APPROXIMATELY 30% SO2 REMOVAL USING ALKALINE FLY ASH. THE DESIGN SO2 REMOVAL EFFICIENCY SINCE THE CONVERSION TO LIME AND ALKALINE FLY ASH SCRUBBING IS 67.5%. OPERATIONS COMMENCED IN NOVEMBER, 1979.
ARIZONA PUBLIC SERVICE FOUR CORNERS 4 RETROFIT 755.0 MW (GROSS) 755.0 MW (ESC) COAL .75 %S LIME UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	ARIZONA PUBLIC SERVICE AWARDED A CONTRACT TO UNITED ENGINEERS FOR A LIME FGD SYSTEM TO BE RETROFITTED ONTO UNITS 4 AND 5 AT ITS FOUR CORNERS STATION IN FARMINGTON, NEW MEXICO. BASED ON THE PROTOTYPE HORIZONTAL SCRUBBING PROGRAM CONDUCTED BY THE UTILITY, A HORIZONTAL SYSTEM WAS CHOSEN TO CONTROL THE EMISSIONS FROM THESE COAL (0.75% S, 8650 BTU/LB) FIRED UNITS. THE PARTICULATE EMISSIONS ARE HANDLED BY AN ESP. START UP IS EXPECTED IN 1982.
ARIZONA PUBLIC SERVICE FOUR CORNERS 5 RETROFIT 755.0 MW (GROSS) 755.0 MW (ESC) COAL .75 %S LIME UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	ARIZONA PUBLIC SERVICE AWARDED A CONTRACT TO UNITED ENGINEERS FOR A LIME FGD SYSTEM TO BE RETROFITTED ONTO UNITS 4 AND 5 AT ITS FOUR CORNERS STATION IN FARMINGTON, NEW MEXICO. BASED ON THE PROTOTYPE HORIZONTAL SCRUBBING PROGRAM CONDUCTED BY THE UTILITY%, A HORIZONTAL SYSTEM WAS CHOSEN TO CONTROL THE EMISSIONS FROM THESE COAL (0.75% S, 8650 BTU/LB) FIRED UNITS. THE PARTICULATE EMISSIONS ARE HANDLED BY AN ESP. START UP IS EXPECTED IN 1982.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
ASSOCIATED ELECTRIC COOP THOMAS HILL 3 NEW 730.0 MW (GROSS) 670.0 MW (ESC) COAL 4.80 %S LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 1/82	THOMAS HILL 3 OF ASSOCIATED ELECTRIC COOP IS A PULVERIZED COAL (4.8% S, 9,700 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN MOBERLY, MISSOURI. TWO COLD SIDE ESP'S WILL PRECEDE THE FOUR 91.5% EFFICIENT PULLMAN KELLOGG HORIZONTA WEIR FGD MODULES USING MAGNESIUM-PROMOTED LIMESTONE AS THE ABSORBENT. THE CLEANED GAS WILL PASS THROUGH A VERTICAL CHEVRON MIST ELIMINATOR TO A 620 FOOT BRICK LINED STACK. REHEAT WILL BE ACCOMPLISHED BY BYPASS. DRY FIXATED SLUDGE WILL BE TRUCKED TO AN ACTIVE STRIP MINE. THE SYSTEM WILL USE A CLOSED WATER LOOP. THE FGD SYSTEM IS UNDER CONSTRUCTION AND START UP IS EXPECTED IN JANUARY 1982.
ATLANTIC CITY ELECTRIC CUMBERLAND 1 NEW 330.0 MW (GROSS) 330.0 MW (ESC) COAL 3.25 %S BITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/88	CUMBERLAND 1 IS A PULVERIZED COAL (3.25%S) FIRED BOILER TO BE LOCATED IN MILLVILLE, NEW JERSEY. THE UTILITY IS CONSIDERING AN FGD SYSTEM WITH A THROWAWAY PRODUCT FOR SO2 CONTROL. OPERATIONS ARE SCHEDULED TO BEGIN IN JANUARY 1988.
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY 1 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL .68 %S LIGNITE LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 4/83	UNIT 1 OF BASIN ELECTRIC POWER COOP'S ANTELOPE VALLEY PLANT IS PRESENTLY UNDER CONSTRUCTION IN BEULAH, NORTH DAKOTA. THIS UNIT WILL BURN PULVERIZED COAL (0.68% S, 6600 BTU/LB LIGNITE) AND SUPPLY 2,055,000 ACFM TO A DRY LIME FGD SYSTEM SUPPLIED BY WESTERN PRECIPITATION. THE 62% EFFICIENT SYSTEM WILL CONSIST OF 5 NIRO ATOMIZER SPRAY DRYERS AND TWO BAGHOUSES. THE CLEANED GAS, ALONG WITH A 4% BYPASS REHEAT, WILL EXIT A 600 FOOT PVC LINED STACK. THE SYSTEM WILL USE A CLOSED WATER LOOP AND THE DRY POWDER WILL BE USED FOR LANDFILL IN A COAL MINE. START UP IS EXPECTED IN APRIL 1983.
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY 2 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL .68 %S LIGNITE LIME/SPRAY DRYING VENDOR NOT SELECTED ENERGY CONSUMPTION: .0% STATUS 5 STARTUP 10/85	ANTELOPE VALLEY 2 OF BASIN ELECTRIC POWER COOP WILL BE LOCATED IN BEULAH, NORTH DAKOTA. THE UTILITY IS PRESENTLY CONSIDERING VARIOUS FGD PROCESSES FOR THIS LIGNITE (0.68% S, 6600 BTU/LB) FIRED UNIT. THE UNIT WILL BE REQUIRED TO COMPLY WITH STATE EMISSIONS STANDARDS VIA BEST AVAILABLE CONTROL TECHNOLOGY. START UP IS SCHEDULED FOR OCTOBER 1985.
BASIN ELECTRIC POWER COOP LARAMIE RIVER 1 NEW 570.0 MW (GROSS) 570.0 MW (ESC) COAL .81 %S SUBBITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: .0% STATUS 1 STARTUP 7/80	BASIN ELECTRIC POWER COOP'S LARAMIE RIVER 1 IS A PULVERIZED COAL (0.8% S, 8139 BTU/LB) FIRED UNIT LOCATED IN WHEATLAND, WYOMING. THE BOILER FEEDS 2,300,000 ACFM OF FLUE GAS THROUGH A COLD SIDE ESP TO FIVE RESEARCH COTTRELL LIMESTONE PACKED TOWER MODULES, WHICH REMOVE 90% OF THE SO2. THE CLEANED GAS EXITS FROM A VERTICAL CHEVRON DEMISTER INTO A 600 FOOT ACID BRICK LINED STACK. NO REHEAT IS USED. THE FLYASH FIXATED SLUDGE IS DEWATERED TO 83% SOLIDS BEFORE BEING LANDFILLED, AND THE SYSTEM EMPLOYS A CLOSED WATER LOOP. OPERATIONS BEGAN ON JULY 1, 1980.
BASIN ELECTRIC POWER COOP LARAMIE RIVER 2 NEW 570.0 MW (GROSS) 570.0 MW (ESC) COAL .81 %S SUBBITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 6/81	BASIN ELECTRIC POWER COOP'S LARAMIE RIVER 2 IS PRESENTLY UNDER CONSTRUCTION IN WHEATLAND, WYOMING. THE PULVERIZED COAL (0.81% S, 8139 BTU/LB) FIRED BOILER WILL FEED 2,300,000 ACFM OF FLUE GAS THROUGH A COLD SIDE ESP TO FIVE RESEARCH COTTRELL LIMESTONE PACKED TOWER MODULES, WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS WILL EXIT FROM A VERTICAL CHEVRON DEMISTER INTO A 600 FOOT ACID BRICK LINED STACK. NO REHEAT WILL BE USED. THE FLYASH FIXATED SLUDGE WILL BE DEWATERED TO 83% SOLIDS BEFORE BEING LANDFILLED, AND THE SYSTEM WILL EMPLOY A CLOSED WATER LOOP. START UP IS SCHEDULED FOR JUNE 1981.

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STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
BASIN ELECTRIC POWER COOP LARAMIE RIVER 3 NEW 570.0 MW (GROSS) 570.0 MW (ESC) COAL .54 %S SUBBITUMINOUS LIME/SPRAY DRYING BABCOCK & WILCOX ENERGY CONSUMPTION: .0% STATUS 2 STARTUP 4/82	LARAMIE RIVER 3 OF BASIN ELECTRIC POWER COOP IS UNDER CONSTRUCTION IN WHEATLAND, WYOMING, AND WILL UTILIZE FOUR DRY LIME INJECTION MODULES, AND A COLD SIDE ESP. THE BOILER WILL FIRE PULVERIZED COAL (0.54% S, 8100 BTU/LB) AND WILL SUPPLY 2,800,000 ACFM OF FLUE GAS TO THE FGD SYSTEM, WHICH WILL REMOVE 85% OF THE SO2 BEFORE THE GAS EXITS THROUGH A 600 FOOT ACID BRICK LINED STACK. A 3% BYPASS WILL BE USED FOR REHEAT. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND WILL LANDFILL THE DRY POWDER WASTE. OPERATIONS ARE SCHEDULED TO COMMENCED IN APRIL 1982.
BIG RIVERS ELECTRIC D.B. WILSON 1 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL ***** %S BITUMINOUS LIMESTONE PULLMAN KELLOG ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 7/84	BIG RIVERS ELECTRIC HAS PLANS FOR TWO NEW UNITS, D.B. WILSON 1 AND 2. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 440 EACH. PULLMAN KELLOG HAS BEEN AWARDED A CONTRACT FOR A WET LIMESTONE FGD SYSTEM. STARTUP IS SCHEDULED FOR JULY 1984.
BIG RIVERS ELECTRIC D.B. WILSON 2 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL ***** %S BITUMINOUS LIMESTONE PULLMAN KELLOG ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 1/86	BIG RIVERS ELECTRIC HAS PLANS FOR TWO NEW UNITS, D.B. WILSON 1 AND 2. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 440 EACH. PULLMAN KELLOG HAS BEEN AWARDED A CONTRACT FOR A WET LIMESTONE FGD SYSTEM. STARTUP IS SCHEDULED FOR JANUARY 1986.
BIG RIVERS ELECTRIC GREEN 1 NEW 242.0 MW (GROSS) 242.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 12/79	UNIT 1 OF BIG RIVERS ELECTRIC'S GREEN STATION IS LOCATED IN SEBREE,KENTUCKY. THE DRY BOTTOM PULVERIZED COAL (3.75% S, 9750 BTU/LB) FIRED BOILER SUPPLIES 1,000,000 ACFM TO A COLD SIDE ESP FOLLOWED BY TWO AMERICAN AIR FILTER LIME SPRAY TOWERS WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS PASSES THROUGH A CHEVRON MIST ELIMINATOR AND EXITS A SAUERISEN 72 LINED STACK AFTER IT IS HEATED BY STEAM COIL REHEATER. THE SLUDGE FROM THE CLOSED WATER LOOP SYSTEM IS POZ-O-TEC STABILIZED. OPERATIONS COMMENCED IN DECEMBER 1979.
BIG RIVERS ELECTRIC GREEN 2 NEW 242.0 MW (GROSS) 242.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 11/80	UNIT 2 OF BIG RIVERS ELECTRIC'S GREEN STATION IS BEING CONSTRUCTED IN SEBREE, KENTUCKY. THE DRY BOTTOM PULVERIZED COAL (3.75% S, 9750 BTU/LB) FIRED BOILER WILL SUPPLY 1,000,000 ACFM TO A COLD SIDE ESP FOLLOWED BY TWO AMERICAN AIR FILTER LIME SPRAY TOWERS WHICH WILL REMOVE 90% OF THE SO2. THE CLEANED GAS WILL PASS THROUGH A CHEVRON MIST ELIMINATOR AND WILL EXIT A SAUERISEN 72 LINED STACK AFTER IT IS HEATED BY STEAM COIL REHEATER. THE SLUDGE FROM THE CLOSED WATER LOOP SYSTEM WILL BE POZ-O-TEC STABILIZED. START UP IS SCHEDULED FOR NOVEMBER 1980.
CAJUN ELECTRIC POWER COOP BIG CAJUN III 1 NEW 540.0 MW (GROSS) 540.0 MW (ESC) COAL ***** %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/85	CAJUN ELECTRIC HAS PLANS TO CONSTRUCT A 540 MW UNIT, BIG CAJUN 3, TO BE LOCATED IN DE SOLO PARISH, LOUISIANA. THE UTILITY IS PRESENTLY CONSIDERING A DRY SCRUBBING PROCESS TO CONTROL EMISSIONS FROM THE PULVERIZED COAL FIRED BOILER. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1985.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
CENTRAL ILLINOIS LIGHT DUCK CREEK 1 NEW 416.0 MW (GROSS) 416.0 MW (ESC) COAL 3.66 %S BITUMINOUS LIMESTONE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: 2.9% STATUS 1 STARTUP 7/76	DUCK CREEK 1 OF CENTRAL ILLINOIS LIGHT IS LOCATED IN CANTON, ILLINOIS. THE BALANCED DRAFT, FRONT FIRED, DRY BOTTOM UNIT BURNS PULVERIZED BITUMINOUS COAL (3.66% S, 10,500 BTU/LB) AND SUPPLIES 2,415,000 ACFM OF FLUE GAS TO TWO COLD SIDE ESP'S FOLLOWED BY FOUR RILEY STOKER/ENVIRONEERING ROD DECK SPRAY TOWER MODULES. THE FGD SYSTEM HAS BEEN OPERATIONAL (ONE MODULE) SINCE JULY, 1976, AND IS DESIGNED TO REMOVE 85% OF THE SO2. HORIZONTAL CHEVRON MIST ELIMINATORS FOLLOW THE ABSORBERS, AND THE CLEANED GAS EXITS TO A 500 FOOT CEILCOTE LINED STACK WITHOUT REHEAT. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE SLUDGE IS DISPOSED OF IN AN ON SITE CLAY LINED POND.
CENTRAL ILLINOIS LIGHT DUCK CREEK 2 NEW 450.0 MW (GROSS) 450.0 MW (ESC) COAL 3.30 %S BITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 1/86	CENTRAL ILLINOIS LIGHT IS CURRENTLY EVALUATING BIDS ON A LIMESTONE OR DUAL ALKALI FGD SYSTEM FOR UNIT 2 OF ITS DUCK CREEK STATION. THE BITUMINOUS COAL FIRED BOILER WILL FEED ITS FLUE GAS THROUGH A COLD SIDE ESP. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP AND IS SCHEDULED TO BEGIN OPERATIONS IN JANUARY, 1986.
CENTRAL ILLINOIS PUBLIC SERV NEWTON 1 NEW 617.0 MW (GROSS) 617.0 MW (ESC) COAL 2.25 %S BITUMINOUS DUAL ALKALI BUELL DIVISION, ENVIROTECH ENERGY CONSUMPTION: 2.4% STATUS 1 STARTUP 9/79	NEWTON 1 OF CENTRAL ILLINOIS PUBLIC SERVICE IS A TANGENTIALLY FIRED, DRY BOTTOM, PULVERIZED BITUMINOUS COAL (2.25% S, 10,900 BTU/LB) FIRED UNIT LOCATED IN NEWTON, ILLINOIS. A COLD SIDE ESP RECEIVES 2,163,480 ACFM OF FLUE GAS AND FEEDS IT TO FOUR BUELL ENVIROTECH POLYSPHERE PACKED TRAY TOWERS FOLLOWED BY TWO VERTICAL MIST ELIMINATORS PER MODULE. THE CLEANED GAS IS BOOSTED 25 DEG F BY A COMBINATION OF TWO DIFFERENT TYPES OF IN-LINE REHEATERS PLUS BYPASS REHEAT, AND THEN EXITS A 530 FOOT PRECRETE LINED STACK. THE WATER LOOP IS CLOSED, AND THE SLUDGE IS POZ-O-TEC TREATED.
CENTRAL ILLINOIS PUBLIC SERVIC NEWTON 2 NEW 617.0 MW (GROSS) 617.0 MW (ESC) COAL 4.00 %S BITUMINIOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 2.4% STATUS 7 STARTUP 12/82	NEWTON 2 OF CENTRAL ILLINOIS PUBLIC SERVICE IS A 617 MW UNIT TO BE LOCATED IN NEWTON, ILLINOIS. THE COMBUSTION ENGINEERING COAL FIRED BOILER WILL UTILIZE AN FGD SYSTEM OR FIRE LOW SULFUR COAL TO CONTROL SO2 EMISSIONS. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN DECEMBER 1982.
CENTRAL MAINE POWER SEARS ISLAND 1 NEW 600.0 MW (GROSS) 600.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/89	SEARS ISLAND 1 IS A PLANNED UNIT TO BE BUILT ON PENOBSCOT BAY BY CENTRAL MAINE POWER. BECAUSE OF THE DISCOVERY OF A GEOLOGICAL FAULT ON SEARS ISLAND, PLANS FOR A 1150 MW NUCLEAR POWER PLANT HAVE BEEN REPLACED WITH PLANS FOR A 600 MW COAL FIRED PLANT. LIME AND LIMESTONE SCRUBBING ARE THE PRIMARY METHODS BEING CONSIDERED FOR COMPLIANCE WITH THE NSPS. IT WILL BE TWO YEARS BEFORE ALL PERMITS REQUIRED HAVE BEEN RECEIVED. START UP IS SCHEDULED FOR JANUARY 1989.
CENTRAL POWER & LIGHT COLETO CREEK 2 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .39 %S SUBBITUMINIOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 9/86	COLETO CREEK 2 OF CENTRAL POWER AND LIGHT IS A COAL (.39%S) FIRED UNIT PLANNED FOR CONSTRUCTION IN FANNIN, TEXAS. THE UNIT IS BEING BUILT BY CENTRAL AND SOUTHWEST SERVICES, BUT WILL BE OPERATED BY CENTRAL POWER AND LIGHT. ONLY DRY SCRUBBING IS BEING CONSIDERED FOR SO2 CONTROL. SCHEDULED STARTUP IS FOR SEPTEMBER 1986.

UNIT IDENTIFICATION	ABSTRACT
CINCINNATI GAS & ELECTRIC EAST BEND 1 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 2.9% STATUS 6 STARTUP 10/87	CINCINNATI GAS AND ELECTRIC HAS PLANS FOR A NEW UNIT, EAST BEND 1, TO BE LOCATED ADJACENT TO EAST BENT 2 AT THE RABBITHASH, KENTUCKY SITE. THE COAL FIRED BOILER WILL HAVE A GENERATING CAPACITY OF 650 MW. THE UNIT IS SCHEDULED TO STARTUP IN OCTOBER 1987.
CINCINNATI GAS & ELECTRIC EAST BEND 2 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 5.00 %S LIME BABCOCK & WILCOX ENERGY CONSUMPTION: 2.9% STATUS 2 STARTUP 12/80	EAST BEND 2 OF CINCINNATI GAS AND ELECTRIC IS A PULVERIZED COAL (5% S) FIRED BOILER UNDER CONSTRUCTION IN RABBITHASH, KENTUCKY. THE EMISSION CONTROL SYSTEM CONSISTS OF A HOT SIDE ESP FOLLOWED BY THREE BABCOCK AND WILCOX LIME FGD MODULES. THE 87% CLEANED GAS WILL PASS THROUGH A CHEVRON MIST ELIMINATOR BEFORE BEING WARMED BY AN INDIRECT HOT AIR REHEATER AND EXITING THROUGH A BRICK LINED 650 FOOT STACK. THE SLUDGE FROM THIS CLOSED WATER LOOP SYSTEM WILL BE POZ-O-TEC STABILIZED BEFORE DISPOSAL IN AN ON SITE LANDFILL. START UP IS EXPECTED IN DECEMBER 1980.
COLORADO UTE ELECTRIC ASSN CRAIG 1 NEW 447.0 MW (GROSS) 447.0 MW (ESC) COAL .45 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 5.4% STATUS 2 STARTUP 10/80	THE COLORADO UTE ELECTRIC ASSN IS PRESENTLY CONSTRUCTING CRAIG 1 IN CRAIG, COLORADO. BOTH UNITS WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.45% S, 10,000 BTU/LB). THE EMISSION CONTROL SYSTEM FOR THIS UNIT WILL CONSIST OF A HOT SIDE ESP AND FOUR MAGNESIUM PROMOTED LIMESTONE SPRAY TOWERS FOR REMOVAL OF PARTICULATE MATTER AND 85% OF THE SO2. THE SCRUBBER EXHAUST WILL BE HEATED BY AN IN-LINE STEAM COIL REHEATER AND WILL PASS THROUGH A 600 FOOT ACID LINED STACK. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP AND THE STABILIZED SLUDGE WILL BE DISPOSED OF IN AN OFF SITE MINEFILL. UNIT 1 START UP IS EXPECTED IN OCTOBER 1980.
COLORADO UTE ELECTRIC ASSN CRAIG 2 NEW 455.0 MW (GROSS) 400.0 MW (ESC) COAL .45 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 1.5% STATUS 1 STARTUP 12/79	THE CRAIG 2 UNIT OF THE COLORADO UTE ELECTRIC ASSN IS LOCATED IN CRAIG, COLORADO AND FIRES PULVERIZED SUBBITUMINOUS COAL (0.45%S, 10,000 BTU/LB). THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A HOT SIDE ESP AND FOUR MAGNESIUM PROMOTED LIMESTONE SPRAY TOWERS FOR REMOVAL OF PARTICULATE MATTER AND 85% OF THE SO2. THE SCRUBBER EXHAUST IS HEATED BY AN IN-LINE STEAM COIL REHEATER AND PASSES THROUGH A 600 FOOT ACID BRICK LINED STACK. THE SYSTEM OPERATES IN A CLOSED LOOP, AND THE STABILIZED SLUDGE IS DISPOSED OF IN AN OFF SITE MINEFILL. START UP OF UNIT 2 WAS IN DECEMBER 1979.
COLORADO UTE ELECTRIC ASSN CRAIG 3 NEW 447.0 MW (GROSS) 447.0 MW (ESC) COAL .45 %S SUBBITUMINOUS LIME/SPRAY DRYING BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/82	COLORADO UTE ELECTRIC ASSN. HAS PLANS FOR A NEW UNIT, CRAIG 3, TO BE LOCATED IN CRAIG, COLORADO ALONG WITH UNITS 1 AND 2. THE UNIT WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.45% S, 10,000 BTU/LB). A CONTRACT HAS BEEN AWARDED TO BABCOCK AND WILCOX FOR A DRY SCRUBBING SYSTEM UTILIZING LIME INJECTION. THE UNIT WILL HAVE A FABRIC FILTER FOR PARTICLE CONTROL. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN 1982.
COLUMBUS & SOUTHERN OHIO ELEC CONESVILLE 5 NEW 411.0 MW (GROSS) 411.0 MW (ESC) COAL 4.67 %S BITUMINOUS LIME AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 3.9% STATUS 1 STARTUP 1/77	CONESVILLE 5 OF COLUMBUS AND SOUTHERN OHIO ELECTRIC IS A DRY BOTTOM, PULVERIZED BITUMINOUS COAL (4.67% S, 10,850 BTU/LB) FIRED UNIT LOCATED IN CONESVILLE, OHIO. A COLD SIDE ESP RECEIVES 1,393,893 ACFM OF FLUE GAS AND PASSES IT TO TWO THIOSORBIC LIME TCA MODULES SUPPLIED BY UOP. THE SO2 REMOVAL EFFICIENCY OF THE TWO MODULES, WHICH BEGAN INITIAL OPERATION IN JANUARY 1977, IS 89.5% (DESIGN). EACH MODULE HAS ONE BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. THE CLEANED GAS EXITS THROUGH AN 800 FOOT TALL ACID BRICK LINED STACK. THE POZ-O-TEC STABILIZED SLUDGE IS PUMPED INTO AN ON SITE DIKED LANDFILL. THE SYSTEM OPERATES IN AN OPEN WATER LOOP.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
COLUMBUS & SOUTHERN OHIO ELEC CONESVILLE 6 NEW 411.0 MW (GROSS) 411.0 MW (ESC) COAL 4.67 %S BITUMINOUS LIME AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 3.9% STATUS 1 STARTUP 6/78	CONESVILLE 6 OF COLUMBUS AND SOUTHERN OHIO ELECTRIC IS A DRY BOTTOM, PULVERIZED BITUMINOUS COAL (4.67% S, 10,850 BTU/LB) FIRED UNIT LOCATED IN CONESVILLE, OHIO. A COLD SIDE ESP RECEIVES 1,393,893 ACFM OF FLUE GAS AND PASSES IT TO TWO THIOSORBIC LIME TCA MODULES SUPPLIED BY UOP. THE SO2 REMOVAL EFFICIENCY OF THE TWO MODULES, WHICH BEGAN INITIAL OPERATION IN JUNE 1978, IS 89.5% (DESIGN). EACH MODULE HAS ONE BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. THE CLEANED GAS EXITS THROUGH AN 800 FOOT TALL ACID BRICK LINED STACK. THE POZ-O-TEC STABILIZED SLUDGE IS PUMPED INTO AN ON SITE DIKED LANDFILL. THE SYSTEM OPERATES IN AN OPEN WATER LOOP.
COLUMBUS & SOUTHERN OHIO ELEC POSTON 5 NEW 425.0 MW (GROSS) 375.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 4.7% STATUS 6 STARTUP 8/86	COLUMBUS AND SOUTHERN OHIO ELECTRIC HAS PLANS FOR TWO NEW UNITS, POSTON 5 AND 6, TO BE LOCATED IN ATHENS, OHIO. THE COAL (2.5% S, 11,000 BTU/LB) FIRED UNITS WILL UTILIZE EITHER A LIME, LIMESTONE, OR DUAL ALKALI FGD SYSTEM. START UP OF UNIT 5 IS EXPECTED IN 1986.
COLUMBUS & SOUTHERN OHIO ELEC POSTON 6 NEW 425.0 MW (GROSS) 375.0 MW (ESC) COAL 2.50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 4.7% STATUS 6 STARTUP 0/89	COLUMBUS AND SOUTHERN OHIO ELECTRIC HAS PLANS FOR TWO NEW UNITS, POSTON 5 AND 6, TO BE LOCATED IN ATHENS, OHIO. THE COAL (2.5% S, 11,000 BTU/LB) FIRED UNITS WILL UTILIZE EITHER A LIME, LIMESTONE, OR DUAL ALKALI FGD SYSTEM. START UP OF UNIT 6 IS EXPECTED IN 1989.
COMMONWEALTH EDISON POWERTON 51 RETROFIT 450.0 MW (GROSS) 450.0 MW (ESC) COAL 3.53 %S LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 5.6% STATUS 1 STARTUP 4/80	COMMONWEALTH EDISON HAS RETROFITTED BOILER NUMBER 51 AT ITS POWERTON STATION WITH A UOP LIMESTONE FGD SYSTEM. UNIT 51 IS ONE OF TWO IDENTICAL BOILERS SUPPLYING STEAM TO AN 850 MW TURBINE. THE PULVERIZED COAL (3.53% S, 10,500 BTU/LB) FIRED BOILER FEEDS FLUE GAS THROUGH AN ESP TO 3 TCA MODULES WHICH ARE DESIGNED TO REMOVE 74% OF THE SO2. A STEAM INDIRECT HOT AIR REHEATER BOOSTS THE TEMPERATURE BEFORE THE GAS EXITS AN ACID BRICK LINED STACK. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE SLUDGE IS POZ-O-TEC STABILIZED AND DISPOSED OF IN A LANDFILL. THE FGD SYSTEM COMMENCED OPERATION IN APRIL, 1980.
COOPERATIVE POWER ASSOCIATION COAL CREEK 1 NEW 545.0 MW (GROSS) 327.0 MW (ESC) COAL .63 %S LIGNITE LIME/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 7/79	COAL CREEK 1 AND 2 ARE TWO PULVERIZED LIGNITE (0.63% S, 6258 BTU/LB) FIRED UNITS OWNED BY THE COOPERATIVE POWER ASSN AND UNITED POWER. A COLD SIDE ESP RECEIVES 2,200,000 ACFM OF FLUE GAS AND EXHAUSTS IT TO FOUR COUNTER-CURRENT SPRAY TOWERS. MIST ELIMINATION IS PROVIDED BY A BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. A MINIMUM OF 40% BYPASS REHEAT IS PROVIDED BEFORE THE CLEANED GAS EXITS THE 650 FOOT ACID BRICK LINED STACK. THE TOWER DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE FLYASH STABILIZED SLUDGE IS DISPOSED IN A CLAY LINED POND. UNIT 1 OPERATIONS BEGAN IN JULY 1979.
COOPERATIVE POWER ASSOCIATION COAL CREEK 2 NEW 545.0 MW (GROSS) 327.0 MW (ESC) COAL .63 %S LIGNITE LIME/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 7/80	COAL CREEK 1 AND 2 ARE TWO PULVERIZED LIGNITE (0.63% S, 6258 BTU/LB) FIRED UNITS OWNED BY THE COOPERATIVE POWER ASSN AND UNITED POWER. A COLD SIDE ESP RECEIVES 2,200,000 ACFM OF FLUE GAS AND EXHAUSTS IT TO FOUR COUNTER-CURRENT SPRAY TOWERS. MIST ELIMINATION IS PROVIDED BY A BULK ENTRAINMENT SEPARATOR AND TWO CHEVRON MIST ELIMINATORS. A MINIMUM OF 40% BYPASS REHEAT IS PROVIDED BEFORE THE CLEANED GAS EXITS THE 650 FOOT ACID BRICK LINED STACK. THE TOWER DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE FLYASH STABILIZED SLUDGE IS DISPOSED OF IN A CLAY LINED POND. UNIT 2 COMMENCED OPERATIONS IN JULY 1980.

UNIT IDENTIFICATION	ABSTRACT
DELMARVA POWER & LIGHT DELAWARE CITY 1 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COKE 7.00 %S FLUID PETROLEUM COKE WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/80	DELAWARE CITY 1, 2, AND 3 OF DELMARVA POWER AND LIGHT ARE THREE RETROFITTED COKE (7-8% S) FIRED BOILERS WHICH HAVE A STEAM CAPACITY OF 500K LB/HR EACH. THE BOILERS GENERATE STEAM AS WELL AS ELECTRICITY FOR GETTY REFINING AND MARKETING. EACH BOILER SUPPLIES 295,000 ACFM OF FLUE GAS TO A MECHANICAL COLLECTOR THEN TO A VENTURI PARTICLE SCRUBBER FOR PARTICULATE CONTROL. THE FLUE GAS THEN PASSES THROUGH A CHEVRON TYPE MIST ELIMINATOR TO A WET ESP FOR BOTH PARTICULATE AND ACID MIST REMOVAL. A FOUR STAGE WELLMAN-LORD SYSTEM, WHICH IS DESIGN FOR 90% REMOVAL, IS USED FOR SO2 CONTROL. HOT AIR INJECTION REHEAT IS USED BEFORE THE GAS EXITS OUT A 500 FT. STACK. THE EMISSION CONTROL SYSTEM IS SUPPLIED BY DAVY MCKEE. IT IS A CLOSED LOOP WATER SYSTEM. IT WAS MADE OPERATIONAL IN MAY 1980.
DELMARVA POWER & LIGHT DELAWARE CITY 2 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COKE 7.00 %S FLUID PETROLEUM COKE WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/80	DELAWARE CITY 1, 2, AND 3 OF DELMARVA POWER AND LIGHT ARE THREE RETROFITTED COKE (7-8% S) FIRED BOILERS WHICH HAVE A STEAM CAPACITY OF 500K LB/HR EACH. THE BOILERS GENERATE STEAM AS WELL AS ELECTRICITY FOR GETTY REFINING AND MARKETING. EACH BOILER SUPPLIES 295,000 ACFM OF FLUE GAS TO A MECHANICAL COLLECTOR THEN TO A VENTURI PARTICLE SCRUBBER FOR PARTICULATE CONTROL. THE FLUE GAS THEN PASSES THROUGH A CHEVRON TYPE MIST ELIMINATOR TO A WET ESP FOR BOTH PARTICULATE AND ACID MIST REMOVAL. A FOUR STAGE WELLMAN-LORD SYSTEM, WHICH IS DESIGN FOR 90% REMOVAL, IS USED FOR SO2 CONTROL. HOT AIR INJECTION REHEAT IS USED BEFORE THE GAS EXITS OUT A 500 FT. STACK. THE EMISSION CONTROL SYSTEM IS SUPPLIED BY DAVY MCKEE. IT IS A CLOSED LOOP WATER SYSTEM. IT WAS MADE OPERATIONAL IN MAY 1980.
DELMARVA POWER & LIGHT DELAWARE CITY 3 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COKE 7.00 %S FLUID PETROLEUM COKE WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/80	DELAWARE CITY 1, 2, AND 3 OF DELMARVA POWER AND LIGHT ARE THREE RETROFITTED COKE (7-8% S) FIRED BOILERS WHICH HAVE A STEAM CAPACITY OF 500K LB/HR EACH. THE BOILERS GENERATE STEAM AS WELL AS ELECTRICITY FOR GETTY REFINING AND MARKETING. EACH BOILER SUPPLIES 295,000 ACFM OF FLUE GAS TO A MECHANICAL COLLECTOR THEN TO A VENTURI PARTICLE SCRUBBER FOR PARTICULATE CONTROL. THE FLUE GAS THEN PASSES THROUGH A CHEVRON TYPE MIST ELIMINATOR TO A WET ESP FOR BOTH PARTICULATE AND ACID MIST REMOVAL. A FOUR STAGE WELLMAN-LORD SYSTEM, WHICH IS DESIGN FOR 90% REMOVAL, IS USED FOR SO2 CONTROL. HOT AIR INJECTION REHEAT IS USED BEFORE THE GAS EXITS OUT A 500 FT. STACK. THE EMISSION CONTROL SYSTEM IS SUPPLIED BY DAVY MCKEE. IT IS A CLOSED LOOP WATER SYSTEM. IT WAS MADE OPERATIONAL IN MAY 1980.
DELMARVA POWER & LIGHT VIENNA 9 NEW 550.0 MW (GROSS) 550.0 MW (ESC) COAL 2.70 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/87	DELMARVA POWER AND LIGHT IS PLANNING A NEW 550 MW (GROSS) UNIT, VIENNA 9, BE CONSTRUCTED IN VIENNA, MARYLAND. THE UTILITY IS PRESENTLY CONSIDERING A LIMESTONE FGD UNIT FOR EMISSION CONTROL. THE PULVERIZED COAL FIRED UNIT WILL BURN COAL WITH AN AVERAGE SULFUR CONTENT OF 2.7% AND IS EXPECTED TO COMMENCE OPERATIONS IN JUNE 1987.
DESERET GEN & TRANS COOP MOON LAKE 1 NEW 410.0 MW (GROSS) 410.0 MW (ESC) COAL .50 %S BITUMINOUS LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 9/84	MOON LAKE 1 IS A PULVERIZED COAL (0.5% S, 10,500 BTU/LB) FIRED UNIT PLANNED BY DESERET GENERATION AND TRANSMISSION COOP TO BE LOCATED IN VERNAL, UTAH. A CONTRACT WAS AWARDED TO COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM HAVING A SO2 REMOVAL EFFICIENCY OF 95%. THE SYSTEM WILL FEATURE A BAGHOUSE, SUPPLIED BY ECOLAIRE, TO REMOVE 99.6% OF THE PARTICULATE MATTER. THE UNIT WILL OPERATE IN A CLOSED WATER LOOP WITH SLUDGE DISPOSAL ON SITE IN A LANDFILL. OPERATIONS ARE SCHEDULED TO COMMENCE IN SEPTEMBER 1984.
DESERET GEN & TRANS COOP MOON LAKE 2 NEW 410.0 MW (GROSS) 410.0 MW (ESC) COAL .50 %S BITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 0/88	MOON LAKE 2 IS A PULVERIZED COAL (0.5% S, 10,500 BTU/LB) FIRED UNIT PLANNED BY DESERET GENERATION AND TRANSMISSION COOP TO BE LOCATED IN VERNAL, UTAH. THE UTILITY IS PRESENTLY REQUESTING BIDS FOR A WET LIMESTONE SCRUBBING SYSTEM HAVING A SO2 REMOVAL EFFICIENCY OF 95%. THE SYSTEM WILL FEATURE A BAGHOUSE DESIGNED TO REMOVE 99.6% OF THE PARTICULATE. THE UNIT WILL OPERATE IN A CLOSED WATER LOOP WITH SLUDGE DISPOSAL ON SITE IN A LANDFILL. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1988.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
DUQUESNE LIGHT ELRAMA 1-4 RETROFIT 510.0 MW (GROSS) 510.0 MW (ESC) COAL 2.20 %S LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 3.5% STATUS 1 STARTUP 10/75	ELRAMA 1-4 OF DUQUESNE LIGHT CONSISTS OF FOUR PULVERIZED COAL (2.2% S, 11,350 BTU/LB) FIRED UNITS LOCATED IN ELRAMA, PENNSYLVANIA. THE EMISSION CONTROL SYSTEM ON THIS SITE CONSISTS OF AN ESP FOLLOWED BY A MECHANICAL COLLECTOR AND FIVE VARIABLE THROAT VENTURI LIME ABSORBER MODULES SUPPLIED BY CHEMICO, WHICH ARE DESIGNED TO REMOVE 83% OF THE SO2 FROM THE FLUE GAS. THE CLEANED GAS PASSES THROUGH A DIRECT OIL FIRED REHEATER BEFORE EXITING A 400 FOOT ACID BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE POZ-O-TEC STABILIZED SLUDGE IS HAULED TO AN OFF SITE LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE OCTOBER 1975.
DUQUESNE LIGHT PHILLIPS 1-6 RETROFIT 408.0 MW (GROSS) 408.0 MW (ESC) COAL 1.92 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 3.4% STATUS 1 STARTUP 7/73	THE PHILLIPS POWER STATION OF DUQUESNE LIGHT CONSISTS OF SIX DRY BOTTOM PULVERIZED COAL (1.92% S, 11,350 BTU/LB) FIRED UNITS LOCATED IN SOUTH HEIGHT, PENNSYLVANIA. PARTICULATE CONTROL IS ACCOMPLISHED BY SIX ESP/MECHANICAL COLLECTOR COMBINATIONS (ONE/BOILER). ONE TWO STAGE AND THREE SINGLE STAGE VARIABLE THROAT VENTURI LIME FGD MODULES SUPPLIED BY CHEMICO ARE DESIGNED TO REMOVE 83% OF THE SO2 FROM THE FLUE GAS. TWO CHEVRON MIST ELIMINATORS/MODULE ARE FOLLOWED BY A DIRECT OIL FIRED REHEATER WHICH RAISES THE GAS TEMPERATURE BY 20 DEG F BEFORE IT LEAVES VIA A 340 FOOT TALL ACID BRICK LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE POZ-O-TEC STABILIZED SLUDGE IS TRUCKED TO AN OFF SITE LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE JULY 1973.
EAST KENTUCKY POWER COOP J.K. SMITH 1 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/85	THE EAST KENTUCKY POWER COOP HAS PLANS TO FIRE TWO NEW UNITS. THE J.K. SMITH UNITS 1 AND 2 WILL UTILIZE EITHER A DRY PROCESS OR A WET LIME PROCESS FOR EMISSION CONTROL. UNIT 1 IS EXPECTED TO START UP IN JANUARY 1985.
EAST KENTUCKY POWER COOP J.K. SMITH 2 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/87	THE EAST KENTUCKY POWER COOP HAS PLANS TO FIRE TWO NEW UNITS. THE J.K. SMITH UNITS 1 AND 2 WILL UTILIZE EITHER A DRY PROCESS OR A WET LIME PROCESS FOR EMISSION CONTROL. UNIT 2 IS EXPECTED TO START UP IN JANUARY 1987.
EAST KENTUCKY POWER COOP SPURLOCK 2 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL 3.50 %S LIME COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 1/81	SPURLOCK 2 OF EAST KENTUCKY POWER COOPERATIVE IS A BALANCED DRAFT PULVERIZED COAL (3.5% S, 11,000 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN MAYSVILLE, KENTUCKY. THE EMISSION CONTROL SYSTEM WILL CONSIST OF AN ESP FOLLOWED BY AN ADL/COMBUSTION EQUIPMENT ASSOCIATES LIME FGD SYSTEM (90% DESIGN SO2 REMOVAL EFFICIENCY). FLUE GAS FROM UNIT ONE WILL BE USED TO REHEAT THE CLEANED GAS. THE SYSTEM, SLATED FOR START UP IN JANUARY 1981, WILL EMPLOY A CLOSED WATER LOOP AND POZ-O-TEC SLUDGE STABILIZATION.
FLORIDA POWER & LIGHT MARTIN 3 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 7 STARTUP 0/87	FLORIDA POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, MARTIN 3 AND 4 TO BE LOCATED IN MARTIN COUNTY, FLORIDA. THE PULVERIZED COAL FIRED BOILERS WILL HAVE A MW RATING OF 800 EACH. THE UTILITY IS CONSIDERING FGD AND ALTERNATIVE METHODS FOR EMISSION CONTROL. THE START UP FOR UNIT 3 IS PROJECTED FOR 1987.

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UNIT IDENTIFICATION                                               ABSTRACT
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FLORIDA POWER & LIGHT          FLORIDA POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, MARTIN 3 AND 4 TO BE
MARTIN                         LOCATED IN MARTIN COUNTY, FLORIDA.  THE PULVERIZED COAL FIRED BOILERS
4                              WILL HAVE A MW RATING OF 800 EACH.  THE UTILITY IS CONSIDERING FGD AND
NEW        800.0 MW (GROSS)    ALTERNATIVE METHODS FOR EMISSION CONTROL.  THE START UP FOR UNIT 4 IS
           800.0 MW (ESC)      PROJECTED FOR 1989.
COAL
***** %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 7     STARTUP  0/89
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GENERAL PUBLIC UTILITIES       GENERAL PUBLIC UTILITIES HAS PLANS TO CONSTRUCT A 625 MW UNIT, COAL 1.
COAL                           THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL
1                              STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS
NEW        625.0 MW (GROSS)    IN 1992.
           625.0 MW (ESC)
COAL
 3.50 %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP 12/92
------------------------------------------------------------------------------------------------------------
GENERAL PUBLIC UTILITIES       GENERAL PUBLIC UTILITIES IS PLANNING TO CONSTRUCT A 625 MW UNIT, COAL 2.
COAL                           THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL
2                              STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS
NEW        625.0 MW (GROSS)    IN 1994.
           625.0 MW (ESC)
COAL
 3.50 %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  5/94
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GENERAL PUBLIC UTILITIES       GENERAL PUBLIC UTILITIES IS PLANNING TO CONSTRUCT A 625 MW UNIT, COAL 3.
COAL                           THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL
3                              STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS
NEW        625.0 MW (GROSS)    IN 1995.
           625.0 MW (ESC)
COAL
 3.50 %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP 12/95
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GENERAL PUBLIC UTILITIES       GENERAL PUBLIC UTILITIES HAS PLANS TO CONSTRUCT A 625 MW UNIT, COAL 4.
COAL                           THE UTILITY IS PRESENTLY CONSIDERING ONLY FGD AS THE EMISSION CONTROL
4                              STRATEGY. THE COAL FIRED (3.5% S) UNIT IS SCHEDULED TO COMMENCE OPERATIONS
NEW        625.0 MW (GROSS)    IN 1997.
           625.0 MW (ESC)
COAL
 3.50 %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  5/97
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GENERAL PUBLIC UTILITIES       COHO 1 IS A (3.5% S) COAL FIRED UNIT PLANNED BY GENERAL PUBLIC UTILITIES T
COHO                           BE LOCATED IN ERIE, PENNSYLVANIA. PRESENTLY BIDS ARE BEING REQUESTED. THE
1                              UTILITY IS PRIMARILY CONSIDERING A LIME OR LIMESTONE NON-SLURRY TYPE FGD
NEW        690.0 MW (GROSS)    SYSTEM. OPERATIONS ARE SCHEDULED TO COMMENCE IN MAY 1991.
           690.0 MW (ESC)
COAL
 3.50 %S
PROCESS NOT SELECTED
VENDOR NOT SELECTED
ENERGY CONSUMPTION:  9.4%
STATUS 5     STARTUP  5/91
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SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
GENERAL PUBLIC UTILITIES SEWARD 7 NEW 690.0 MW (GROSS) 690.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: 9.4% STATUS 5 STARTUP 5/87	GENERAL PUBLIC UTILITIES IS PLANNING A NEW UNIT, SEWARD 7, TO BE BUILT IN SEWARD, PENNSYLVANIA. THE UTILITY IS PRESENTLY REQUESTING BIDS FOR AN FGD SYSTEM, WITH NON-SLURRY TYPE LIME AND LIMESTONE SYSTEMS BEING THE PRIMARY CONSIDERATION. START UP IS EXPECTED IN MAY 1987.
GRAND HAVEN BRD OF LIGHT & PWR J.B. SIMS 3 NEW 65.0 MW (GROSS) 65.0 MW (ESC) COAL 2.75 %S BITUMINOUS LIME BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/83	THE GRAND HAVEN BOARD OF LIGHT AND POWER'S J.B. SIMS 3 IS A BITUMINIOUS COAL (2.75% S, 11,000 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN GRAND HAVEN, MICHIGAN. A CONTRACT HAS BEEN AWARDED TO BABCOCK AND WILCOX TO SUPPLY TWO SPRAY TOWERS TO CONTROL SO2 EMISSIONS. EACH SCRUBBER SYSTEM WILL UTILIZE A CHEVRON MIST ELIMINATOR AND AN IN-LINE REHEATER. THE SLUDGE IS TO BE DISPOSED OF IN AN OFF SITE LANDFILL. OPERATIONS ARE TO COMMENCE IN JUNE 1983.
HOOSIER ENERGY MEROM 1 NEW 490.0 MW (GROSS) 441.0 MW (ESC) COAL 3.50 %S LIMESTONE MITSUBISHI HEAVY INDUSTRIES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 5/82	MEROM 1 AND 2 ARE TWO NEW UNITS BEING BUILT BY HOOSIER ENERGY IN SULLIVAN, INDIANA. THESE PULVERIZED COAL (3.5% S) FIRED UNITS WILL PRODUCE 1,732,000 ACFM OF FLUE GAS WHICH WILL BE CLEANED BY A COLD SIDE ESP UPSTREAM OF A MITSUBISHI LIMESTONE GRID TOWER ABSORBER (90% DESIGN SO2 REMOVAL). THE SYSTEM WILL UTILIZE BYPASS REHEAT AND A 700 FOOT STACK. THE SLUDGE WILL BE STABILIZED AND LANDFILLED, AND THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP OF UNIT 1 IS SCHEDULED FOR MAY 1982.
HOOSIER ENERGY MEROM 2 NEW 490.0 MW (GROSS) 441.0 MW (ESC) COAL 3.50 %S LIMESTONE MITSUBISHI HEAVY INDUSTRIES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 9/81	MEROM 1 AND 2 ARE TWO NEW UNITS BEING BUILT BY HOOSIER ENERGY IN SULLIVAN, INDIANA. THESE PULVERIZED COAL (3.5% S) FIRED UNITS WILL PRODUCE 1,732,000 ACFM OF FLUE GAS WHICH WILL BE CLEANED BY A COLD SIDE ESP UPSTREAM OF A MITSUBISHI LIMESTONE GRID TOWER ABSORBER (90% DESIGN SO2 REMOVAL). THE SYSTEM WILL UTILIZE BYPASS REHEAT AND A 700 FOOT STACK. THE SLUDGE WILL BE STABILIZED AND LANDFILLED, AND THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP OF UNIT 2 IS SCHEDULED FOR SEPTEMBER 1981.
HOUSTON LIGHTING & POWER LIMESTONE 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL 1.08 %S LIGNITE LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 12/84	HOUSTON LIGHTING AND POWER CO HAS PLANS FOR TWO NEW UNITS, LIMESTONE 1 AND 2, TO BE LOCATED IN JEWITT, TEXAS. THE PULVERIZED COAL (1.08% S, 6177 BTU/LB) FIRED BOILER WILL UTILIZE A WET LIMESTONE SCRUBBING PROCESS FOR PRIMARY SO2 COLLECTION. A COLD SIDE ESP WILL ALSO BE USED FOR PRIMARY PARTICLE CONTROL. THE UTILITY IS PRESENTLY REQUESTING/EVALUATING BIDS FOR THE FGD SYSTEM. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN 1984.
HOUSTON LIGHTING & POWER LIMESTONE 2 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL 1.08 %S LIGNITE LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 12/85	HOUSTON LIGHTING AND POWER CO HAS PLANS FOR TWO NEW UNITS, LIMESTONE 1 AND 2, TO BE LOCATED IN JEWITT, TEXAS. THE PULVERIZED COAL (1.08% S, 6177 BTU/LB) FIRED BOILER WILL UTILIZE A WET LIMESTONE SCRUBBING PROCESS FOR PRIMARY SO2 COLLECTION. A COLD SIDE ESP WILL ALSO BE USED FOR PRIMARY PARTICLE CONTROL. THE UTILITY IS PRESENTLY REQUESTING/EVALUATING BIDS FOR THE FGD SYSTEM. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN 1985.

SECTION 2
STATUS OF FGD SYSTEMS

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UNIT IDENTIFICATION                                              ABSTRACT
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HOUSTON LIGHTING & POWER      W.A. PARISH 8 OF HOUSTON LIGHTING & POWER IS A PULVERIZED COAL (0.6% S,
W.A. PARISH                   8700 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN THOMPSONS, TEXAS. CHEMICO
8                             WILL SUPPLY A LIMESTONE FGD SYSTEM WHICH WILL REMOVE 82% OF THE FLUE
NEW        600.0 MW (GROSS)   GAS SO2. REHEAT WILL BE PROVIDED BY BYPASSING 18% OF THE PARTICULATE
           492.0 MW (ESC)     CLEANED FLUE GAS. SLUDGE WILL BE DEWATERED, BLENDED WITH FLYASH, AND
COAL                          DISPOSED IN AN ON SITE LANDFILL. OPERATIONS ARE SCHEDULED TO COMMENCE
  .60 %S  SUBBITUMINOUS       IN NOVEMBER 1982.
LIMESTONE
CHEMICO DIVISION, ENVIROTECH
ENERGY CONSUMPTION: ****%
STATUS 2     STARTUP 11/82
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INDIANAPOLIS POWER & LIGHT    INDIANAPOLIS POWER AND LIGHT HAS PLANS FOR THREE NEW UNITS, PATRIOT 1, 2,
PATRIOT                       AND 3, TO BE LOCATED IN PATRIOT, INDIANA.  THE UTILITY PLANS ON UTILIZING
1                             A LIMESTONE FGD PROCESS FOR EMISSION CONTROL.
NEW        650.0 MW (GROSS)
           650.0 MW (ESC)
COAL
 3.50 %S
LIMESTONE
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  0/87
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INDIANAPOLIS POWER & LIGHT    INDIANAPOLIS POWER AND LIGHT HAS PLANS FOR THREE NEW UNITS, PATRIOT 1, 2,
PATRIOT                       AND 3, TO BE LOCATED IN PATRIOT, INDIANA.  THE UTILITY PLANS ON UTILIZING
2                             A LIMESTONE FGD PROCESS FOR EMISSION CONTROL.
NEW        650.0 MW (GROSS)
           650.0 MW (ESC)
COAL
 3.50 %S
LIMESTONE
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  0/ 0
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INDIANAPOLIS POWER & LIGHT    INDIANAPOLIS POWER AND LIGHT HAS PLANS FOR THREE NEW UNITS, PATRIOT 1, 2,
PATRIOT                       AND 3, TO BE LOCATED IN PATRIOT, INDIANA.  THE UTILITY PLANS ON UTILIZING
3                             A LIMESTONE FGD PROCESS FOR EMISSION CONTROL.
NEW        650.0 MW (GROSS)
           650.0 MW (ESC)
COAL
 3.50 %S
LIMESTONE
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 6     STARTUP  0/ 0
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INDIANAPOLIS POWER & LIGHT    PETERSBURG 3 OF INDIANAPOLIS POWER AND LIGHT IS LOCATED IN PETERSBURG,
PETERSBURG                    INDIANA, AND BURNS 3.25% S BITUMINOUS COAL (11,000 BTU/LB). TWO COLD SIDE
3                             ESP'S ARE LOCATED UPSTREAM OF 4 85% EFFICIENT UOP LIMESTONE TCA MODULES.
NEW        532.0 MW (GROSS)   A HORIZONTAL MIST ELIMINATOR PRECEDES AN INDIRECT HOT AIR REHEATER THAT
           532.0 MW (ESC)     BOOSTS THE GAS TEMPERATURE BY 30 DEG F BEFORE IT EXITS THE 616 FOOT RIGI-
COAL                          FLAKE 4850 LINED STACK. STABILIZED SLUDGE IS DISPOSED IN AN ON SITE POND,
 3.25 %S  BITUMINOUS          AND THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. THIS UNIT HAS BEEN
LIMESTONE                     OPERATIONAL SINCE DECEMBER 1977.
AIR CORRECTION DIVISION, UOP
ENERGY CONSUMPTION:  2.4%
STATUS 1     STARTUP 12/77
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INDIANAPOLIS POWER & LIGHT    PETERSBURG 4 OF INDIANAPOLIS POWER AND LIGHT IS A BITUMINOUS COAL (3.50% S
PETERSBURG                    11,000 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN PETERSBURG, INDIANA. THE
4                             LIMESTONE FGD SYSTEM FOR THIS UNIT WILL BE SUPPLIED BY RESEARCH COTTRELL.
NEW        530.0 MW (GROSS)   THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND SLUDGE WILL BE POZ-O-
           530.0 MW (ESC)     TEC STABILIZED BEFORE PONDING. START UP IS SLATED FOR OCTOBER 1984.
COAL
 3.50 %S  BITUMINOUS
LIMESTONE
RESEARCH-COTTRELL
ENERGY CONSUMPTION:  2.1%
STATUS 2     STARTUP 10/84
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SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
IOWA ELECTRIC LIGHT & PWR GUTHRIE CO. 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .40 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 11/84	IOWA ELECTRIC LIGHT AND POWER HAS PLANS TO CONSTRUCT A 720 MW UNIT, GUTHRIE COUNTY 1, TO BE LOCATED IN PANORA, IOWA. THE PULVERIZED SUBBITUMINOUS COAL (0.4% S, 8180 BTU/LB) FIRED BOILER WILL UTILIZE A WET LIMESTONE SCRUBBING SYSTEM AND AN ESP FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 650 FOOT STACK. THE UTILITY STARTED REQUESTING/ EVALUATING BIDS IN JANUARY 1980 AND HAS PROJECTED THE STARTUP TO BE IN OCTOBER 1984.
JACKSONVILLE ELEC AUTHORITY NEW PROJECT 1 NEW 600.0 MW (GROSS) 600.0 MW (ESC) COAL 3.00 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 12/85	THE JACKSONVILLE ELECTRIC AUTHORITY HAS PLANS FOR TWO NEW UNITS, NEW GENERATING PROJECT 1 AND 2, TO BE LOCATED IN EAST PORT, FLORIDA. EACH UNIT WILL BURN PULVERIZED COAL (2-4% S) AND SUPPLY 2,660,000 ACFM TO A WET LIMESTONE FGD PROCESS AND AN ESP FOR EMISSION CONTROL. THE CLEANED FLUE GAS IS TO EXIT A 285 FOOT STACK. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN 1965.
JACKSONVILLE ELEC AUTHORITY NEW PROJECT 2 NEW 600.0 MW (GROSS) 600.0 MW (ESC) COAL 3.00 %S LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/87	THE JACKSONVILLE ELECTRIC AUTHORITY HAS PLANS FOR TWO NEW UNITS, NEW GENERATING PROJECT 1 AND 2, TO BE LOCATED IN EAST PORT, FLORIDA. EACH UNIT WILL BURN PULVERIZED COAL (2-4% S) AND SUPPLY 2,660,000 ACFM TO A WET LIMESTONE FGD PROCESS AND AN ESP FOR EMISSION CONTROL. THE CLEANED FLUE GAS IS TO EXIT A 285 FOOT STACK. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN 1967.
KANSAS CITY POWER & LIGHT HAWTHORN 3 RETROFIT 90.0 MW (GROSS) 90.0 MW (ESC) COAL .60 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.2% STATUS 1 STARTUP 11/72	HAWTHORN 3 OF KANSAS CITY POWER AND LIGHT IS A DRY BOTTOM PULVERIZED BITUMINOUS COAL (0.6% S, 9800 BTU/LB) FIRED UNIT LOCATED IN KANSAS CITY, MISSOURI, WHICH WAS CONVERTED FROM LIMESTONE FURNACE INJECTION AND TAIL END SCRUBBING TO A LIME SLURRY SYSTEM. TWO COMBUSTION ENGINEERING MARBLE BED ABSORBERS, WHICH WERE DESIGNED TO REMOVE 70% OF THE FLUE GAS SO2, BEGAN OPERATION IN JANUARY 1977. ONE HORIZONTAL CHEVRON MIST ELIMINATOR PER MODULE IS UPSTREAM OF AN IN-LINE FINNED TUBE REHEATER, WHICH RAISES THE TEMPERATURE OF THE CLEANED GAS BEFORE IT EXITS THROUGH A GUNITE LINED 200 FOOT STACK. THE FLYASH STABILIZED SLUDGE IS DEPOSITED IN AN UNLINED SLUDGE POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE.
KANSAS CITY POWER & LIGHT HAWTHORN 4 RETROFIT 90.0 MW (GROSS) 90.0 MW (ESC) COAL .60 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.2% STATUS 1 STARTUP 8/72	HAWTHORN 4 OF KANSAS CITY POWER AND LIGHT IS A DRY BOTTOM PULVERIZED BITUMINOUS COAL (0.6% S, 9800 BTU/LB) FIRED UNIT LOCATED IN KANSAS CITY, MISSOURI, WHICH WAS CONVERTED FROM LIMESTONE FURNACE INJECTION AND TAIL END SCRUBBING TO A LIME SLURRY SYSTEM. TWO COMBUSTION ENGINEERING MARBLE BED ABSORBERS, WHICH WERE DESIGNED TO REMOVE 70% OF THE FLUE GAS SO2, BEGAN OPERATION IN JANUARY 1977. ONE HORIZONTAL CHEVRON MIST ELIMINATOR PER MODULE IS UPSTREAM OF AN IN-LINE FINNED TUBE REHEATER, WHICH RAISES THE TEMPERATURE OF THE CLEANED GAS BEFORE IT EXITS THROUGH A GUNITE LINED 200 FOOT STACK. THE FLYASH STABILIZED SLUDGE IS DEPOSITED IN AN UNLINED SLUDGE POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE.
KANSAS CITY POWER & LIGHT LA CYGNE 1 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL 5.39 %S SUBBITUMINOUS LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 2.9% STATUS 1 STARTUP 2/73	LA CYGNE 1 IS A WET BOTTOM, CYCLONE FIRED PULVERIZED SUBBITUMINOUS COAL (5.39% S, 9421 BTU/LB) FIRED UNIT OF KANSAS CITY POWER AND LIGHT, LOCATED IN LA CYGNE, KANSAS. THE EMISSION CONTROL SYSTEM CONSISTS OF EIGHT VARIABLE THROAT VENTURI/LIMESTONE SIEVE TRAY TOWER TRAINS SUPPLIED BY BABCOCK AND WILCOX. EACH 80% (SO2 REMOVAL, DESIGN) EFFICIENT TRAIN IS FOLLOWED BY A COMBINATION SIEVE TRAY AND CHEVRON MIST ELIMINATOR, FOLLOWED BY AN INDIRECT REHEATER. THE CLEANED GAS EXITS THROUGH A 700 FOOT STEEL LINED STACK. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE SCRUBBER SLUDGE IS DISPOSED IN AN UNLINED POND. INITIAL OPERATIONS OF THE FGD SYSTEM BEGAN IN FEBRUARY 1973.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
KANSAS POWER & LIGHT JEFFREY 1 NEW 720.0 MW (GROSS) 540.0 MW (ESC) COAL .32 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 8/78	KANSAS CITY POWER AND LIGHT'S JEFFREX 1 IS A TANGENTIAL FIRED PULVERIZED COAL (0.32% S, 8125 BTU/LB) UNIT IN WAMEGO, KANSAS. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A COLD SIDE ESP FOLLOWED BY SIX (ONE SPARE) LIMESTONE SPRAY TOWER MODULES SUPPLIED BY COMBUSTION ENGINEERING. THE DESIGN SO2 REMOVAL EFFICIENCY IS 50% (INCLUDING A 30% BYPASS REHEAT). THE UNIT HAS BEEN OPERATIONAL SINCE AUGUST 1978.
KANSAS POWER & LIGHT JEFFREY 2 NEW 700.0 MW (GROSS) 490.0 MW (ESC) COAL .30 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/80	UNIT 2, PRESENTLY OPERATING AT KANSAS POWER AND LIGHT'S JEFFREY ENERGY CENTER IN JEFFREY, KANSAS, BURNS 0.3% S PULVERIZED COAL (8100 BTU/LB). THIS UNIT'S EMISSION CONTROL SYSTEM CONSISTS OF A COLD SIDE ESP AND COMBUSTION ENGINEERING LIMESTONE SPRAY TOWERS. A 30% FLUE GAS BYPASS PROVIDES REHEAT OF THE CLEANED GAS BEFORE IT EXITS THROUGH A 600 FOOT STACK. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE, AND THE SLUDGE IS STABILIZED WITH BOTTOM ASH AND PIPED TO AN ON-SITE CLAY LINED POND. INITIAL OPERATIONS COMMENCED IN APRIL 1980.
KANSAS POWER & LIGHT LAWRENCE 4 RETROFIT 125.0 MW (GROSS) 125.0 MW (ESC) COAL .55 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 1/76	LAWRENCE 4 OF KANSAS POWER AND LIGHT IS A BALANCED DRAFT, TANGENTIAL FIRED PULVERIZED COAL (0.55% S, 10,000 BTU/LB) UNIT LOCATED IN LAWRENCE, KANSAS. A NEW COMPUSTION ENGINEERING LIMESTONE ROD DECK/SPRAY TOWER SYSTEM REPLACED THE EXISTING MARBLE BED TAIL END SCRUBBER IN JANUARY 1977. THE SYSTEM TREATS 403,000 ACFM OF FLUE GAS, WITH A DESIGN SO2 REMOVAL OF 73%. MIST ELIMINATION IS ACCOMPLISHED BY TWO CHEVRONS AND ONE BULK ENTRAINMENT SEPARATOR FOLLOWING EACH OF THE TWO MODULES. A FINNED TUBE REHEATER BOOSTS THE TEMPERATURE OF THE CLEANED GAS BY 20 DEG F BEFORE IT IS EXHAUSTED THROUGH A 120 FOOT STACK. THE SLUDGE IS DISPOSED IN AN UNLINED INTERIM POND, WHICH OVERFLOWS INTO A FINAL DISPOSAL POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP.
KANSAS POWER & LIGHT LAWRENCE 5 RETROFIT 420.0 MW (GROSS) 420.0 MW (ESC) COAL .55 %S LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/71	LAWRENCE 5 OF KANSAS POWER AND LIGHT IS A BALANCED DRAFT, TANGENTIAL FIRED PULVERIZED COAL (0.55% S, 10,000 BTU/LB) UNIT LOCATED IN LAWRENCE, KANSAS. A NEW COMBUSTION ENGINEERING LIMESTONE ROD DECK/SPRAY TOWER SYSTEM REPLACED THE EXISTING MARBLE BED TAIL END SCRUBBER IN APRIL 1978. THE SYSTEM TREATS 403,000 ACFM OF FLUE GAS, WITH A DESIGN SO2 REMOVAL OF 73%. MIST ELIMINATION IS ACCOMPLISHED BY TWO CHEVRONS AND ONE BULK ENTRAINMENT SEPARATOR FOLLOWING EACH OF THE TWO MODULES. A FINNED TUBE REHEATER BOOSTS THE TEMPERATURE OF THE CLEANED GAS BY 20 DEG F BEFORE IT IS EXHAUSTED THROUGH A 120 FOOT STACK. THE SLUDGE IS DISPOSED IN AN UNLINED INTERIM POND, WHICH OVERFLOWS INTO A FINAL DISPOSAL POND. THE SYSTEM OPERATES IN A CLOSED WATER LOOP.
KENTUCKY UTILITIES GREEN RIVER 1-3 RETROFIT 64.0 MW (GROSS) 64.0 MW (ESC) COAL 4.00 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: 3.1% STATUS 1 STARTUP 9/75	GREEN RIVER 1-3 OF KENTUCKY UTILITIES ARE THREE DRY BOTTOM PULVERIZED BITUMINOUS COAL (4% S, 11,000 BTU/LB) FIRED UNITS LOCATED IN CENTRAL CITY, KENTUCKY. EACH BOILER SUPPLIES 360,000 ACFM OF FLUE GAS TO A VARIABLE THROAT VENTURI FOLLOWED BY AN AMERICAN AIR FILTER LIME MOBILE BED CONTACTOR (80% DESIGN SO2 REMOVAL EFFICIENCY). A RADIAL VANE MIST ELIMINATOR IS FOLLOWED BY A STEAM TUBE REHEATER AND A 165 FOOT STACK. SLUDGE IS DISPOSED IN AN ON-SITE UNLINED POND, AND THE SYSTEM OPERATES IN A CLOSED WATER LOOP. THE SYSTEM HAS BEEN OPERATIONAL SINCE SEPTEMBER 1975.
LAKELAND UTILITIES MCINTOSH 3 NEW 364.0 MW (GROSS) 364.0 MW (ESC) COAL 2.56 %S BITUMINOUS LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 8/81	MCINTOSH 3 OF LAKELAND UTILITIES IS BEING CONSTRUCTED IN LAKELAND, FLORIDA. BABCOCK AND WILCOX HAS BEEN AWARDED A CONTRACT TO SUPPLY AN 85% EFFICIENT (SO2) LIMESTONE FGD SYSTEM FOR THIS UNIT. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A COLD SIDE ESP FOLLOWED BY TWO PARALLEL FGD MODULES AND A 250 FOOT ACID BRICK LINED STACK. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND THE POZ-O-TEC STABILIZED SLUDGE WILL BE USED AS A CONSTRUCTION BASE. CONSTRUCTION BEGAN IN NOVEMBER 1979 AND START UP IS SCHEDULED TO BE IN AUGUST 1981.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
LANSING BOARD OF WATER & LIGHT ERICKSON 2 NEW 160.0 MW (GROSS) 160.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 1/87	THE ERICKSON 2 STATION OF THE LANSING BOARD OF WATER AND LIGHT IS A PLANNED UNIT TO BE LOCATED IN DELTA TOWNSHIP, MICHIGAN. THE UNIT WILL HAVE A MW RATING OF BETWEEN 160 AND 250, DEPENDING ON WHETHER OTHER MUNICIPALITIES WILL JOIN IN THIS PROJECT. THE UTILITY IS PRESENTLY CONSIDERING THE USE OF FGD FOR EMISSION CONTROL. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1987.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 1 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/86	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAS PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN 1986.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 2 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/87	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAS PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN 1987.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 3 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/88	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAS PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 3 IS SCHEDULED TO COMMENCE OPERATIONS IN 1988.
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN 4 NEW 820.0 MW (GROSS) 820.0 MW (ESC) COAL .79 %S SUBBITUMINOUS LIME VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/89	THE LOS ANGELES DEPARTMENT OF WATER AND POWER HAS PLANS FOR FOUR NEW BOILERS, INTERMOUNTAIN 1, 2, 3 AND 4, TO BE LOCATED IN DELTA, UTAH. EACH 820 MW BOILER WILL FIRE PULVERIZED COAL (0.79% S, 10,200 BTU/LB) AND WILL SUPPLY 5,400,000 ACFM OF FLUE GAS TO A WET LIME SCRUBBING SYSTEM. A HORIZONTAL WEIR TYPE SCRUBBER ALONG WITH A HOT SIDE ESP IS UNDER CONSIDERATION BY THE UTILITY FOR EMISSION CONTROL. THE CLEANED FLUE GAS WILL EXIT A 750 FOOT STACK. UNIT 4 IS SCHEDULED TO COMMENCE OPERATIONS IN 1989.
LOUISVILLE GAS & ELECTRIC CANE RUN 4 RETROFIT 188.0 MW (GROSS) 188.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 8/76	UNIT 4 AT LOUISVILLE GAS AND ELECTRIC'S CANE RUN STATION IS A PULVERIZED BITUMINOUS COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT IN LOUISVILLE, KENTUCKY. AN ESP AND TWO AMERICAN AIR FILTER CARBIDE LIME MOBILE BED ABSORBER MODULES (85% DESIGN SO2 REMOVAL) TREAT 734,000 ACFM OF FLUE GAS FROM THE BOILER. TWO CHEVRON MIST ELIMINATORS/MODULE ARE FOLLOWED BY A DIRECT COMBUSTION REHEATER AND A 250 FOOT STACK. THE WATER LOOP IS OPEN, AND THE SLUDGE IS DISPOSED IN AN ON-SITE LINED POND. THIS RETROFIT SYSTEM HAS BEEN OPERATIONAL SINCE AUGUST 1976.

UNIT IDENTIFICATION	ABSTRACT
LOUISVILLE GAS & ELECTRIC CANE RUN 5 RETROFIT 200.0 MW (GROSS) 200.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 1.5% STATUS 1 STARTUP 12/77	CANE RUN 5 OF LOUISVILLE GAS AND ELECTRIC IS A PULVERIZED BITUMINOUS COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT LOCATED IN LOUISVILLE, KENTUCKY. THE BOILER SUPPLIES 700,000 ACFM OF FLUE GAS TO AN EMISSION CONTROL SYSTEM CONSISTING OF AN ESP FOLLOWED AND TWO COMBUSTION ENGINEERING 85% EFFICIENT (DESIGN) CARBIDE LIME SPRAY TOWERS. A STEAM TUBE REHEATER RAISES THE GAS TEMPERATURE 40 DEG F. THE SYSTEM OPERATES IN AN OPEN WATER LOOP MODE, AND THE SLUDGE IS POZ-O-TEC STABILIZED. OPERATION OF THIS RETROFIT SYSTEM BEGAN IN DECEMBER 1977.
LOUISVILLE GAS & ELECTRIC CANE RUN 6 RETROFIT 299.0 MW (GROSS) 299.0 MW (ESC) COAL 4.80 %S BITUMINOUS DUAL ALKALI COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: 1.0% STATUS 1 STARTUP 4/79	LOUISVILLE GAS AND ELECTRIC'S CANE RUN 6 IS A PULVERIZED BITUMINOUS COAL (4.80% S, 11,500 BTU/LB) FIRED UNIT IN LOUISVILLE, KENTUCKY. ADL/COMBUSTION EQUIPMENT ASSOCIATES SUPPLIED A RETROFIT DUAL ALKALI DEMONSTRATION FGD SYSTEM FOR THIS UNIT. THE EMISSION CONTROL SYSTEM, DESIGNED TO REMOVE 95% OF THE FLUE GAS SO2, CONSISTS OF A COLD SIDE ESP AND TWO TRAY TOWER MODULES. THE CLEANED GAS PASSES THROUGH A CHEVRON MIST ELIMINATOR AND TWO DIRECT COMBUSTION REHEATERS BEFORE EXITING A 518 FOOT STACK. THE WATER LOOP IS OPEN, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED POND. FOR A ONE YEAR PERIOD FOLLOWING THE FIRST QUARTER OF OPERATION (WHICH BEGAN IN APRIL 1979), THE U.S.EPA WILL SUBSIDIZE A MAX OF $4.5 MM FOR OPERATION, R&D, AND REPORT WRITING (NOT APPLIED TO ANY CAPITAL EXPENDITURES).
LOUISVILLE GAS & ELECTRIC MILL CREEK 1 RETROFIT 358.0 MW (GROSS) 358.0 MW (ESC) COAL 3.75 %S LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 1.4% STATUS 2 STARTUP 1/81	MILL CREEK 1 OF LOUISVILLE GAS AND ELECTRIC IS LOCATED IN LOUISVILLE, KENTUCKY. A RETROFIT LIME/LIMESTONE FGD SYSTEM IS PRESENTLY UNDER CONSTRUCTION ON THIS PULVERIZED COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT. COMBUSTION ENGINEERING IS SUPPLYING THE LIME/LIMESTONE FGD SYSTEM WHICH WILL COMPLY WITH LOCAL EMISSION STANDARDS BY APRIL 1981.
LOUISVILLE GAS & ELECTRIC MILL CREEK 2 RETROFIT 350.0 MW (GROSS) 350.0 MW (ESC) COAL 3.75 %S LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 1.4% STATUS 2 STARTUP 12/81	MILL CREEK 2 OF LOUISVILLE GAS AND ELECTRIC IS LOCATED IN LOUISVILLE, KENTUCKY. A RETROFIT LIME/LIMESTONE FGD SYSTEM IS PRESENTLY UNDER CONSTRUCTION ON THIS PULVERIZED COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT. COMBUSTION ENGINEERING IS SUPPLYING THE LIME/LIMESTONE FGD SYSTEM WHICH WILL COMPLY WITH LOCAL EMISSION STANDARDS BY APRIL 1982.
LOUISVILLE GAS & ELECTRIC MILL CREEK 3 NEW 442.0 MW (GROSS) 442.0 MW (ESC) COAL 3.75 %S BITUMINOUS LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 8/78	LOUISVILLE GAS AND ELECTRIC'S MILL CREEK 3 IS A 3.75% S COAL (11,500 BTU/LB) FIRED UNIT LOCATED IN LOUISVILLE, KENTUCKY. AMERICAN AIR FILTER SUPPLIED A CARBIDE LIME FGD SYSTEM FOR THIS UNIT WHICH WAS DESIGNED TO REMOVE 85% OF THE SO2 FROM THE FLUE GAS. AN ESP IS FOLLOWED BY FOUR MOBILE BED SPRAY TOWERS AND A STEAM TUBE REHEATER. THE WATER LOOP IS OPEN, AND THE FLYASH AND LIME STABILIZED SLUDGE IS PONDED. THIS UNIT HAS BEEN OPERATIONAL SINCE AUGUST 1978.
LOUISVILLE GAS & ELECTRIC MILL CREEK 4 NEW 530.0 MW (GROSS) 495.0 MW (ESC) COAL 3.75 %S LIME AMERICAN AIR FILTER ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/82	MILL CREEK 4 OF LOUISVILLE GAS AND ELECTRIC IS A PULVERIZED BITUMINOUS COAL (3.75% S, 11,500 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN LOUISVILLE, KENTUCKY. THE EMISSION CONTROL SYSTEM WILL CONSIST OF AN ESP AND FOUR MOBILE BED SPRAY TOWERS. THE SYSTEM'S WATER LOOP WILL BE CLOSED, AND THE SLUDGE WILL BE STABILIZED WITH LIME AND FLYASH. STEAM TUBES WILL PROVIDE REHEAT OF THE CLEANED GASES. THE SYSTEM IS SCHEDULED TO START UP IN JUNE 1982.

UNIT IDENTIFICATION	ABSTRACT
LOUISVILLE GAS & ELECTRIC PADDY'S RUN 6 RETROFIT 72.0 MW (GROSS) 72.0 MW (ESC) COAL 2.50 %S BITUMINOUS LIME COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.8% STATUS 1 STARTUP 4/73	UNIT 6 AT LOUISVILLE GAS AND ELECTRIC'S PADDY'S RUN STATION IS A DRY BOTTOM PULVERIZED COAL (2.5% S, 11,500 BTU/LB) FIRED UNIT IN LOUISVILLE, KENTUCKY. A RETROFIT CARBIDE LIME FGD SYSTEM BY COMBUSTION ENGINEERING TREATS 400,000 ACFM OF FLUE GAS FROM THE BOILER. AN ESP IS FOLLOWED BY TWO MARBLE BED ABSORBERS, A DIRECT COMBUSTION REHEATER, AND A 250 FOOT STACK. MIST ELIMINATION IS PROVIDED BY ONE CHEVRON/MODULE. THE LIME FIXATED SLUDGE IS TRUCKED TO AN UNLINED POND, AND THE WATER LOOP IS CLOSED. THE FGD SYSTEM BEGAN INITIAL OPERATIONS IN APRIL 1973.
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY 1 NEW 575.0 MW (GROSS) 575.0 MW (ESC) COAL 4.00 %S BITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 7/85	LOUISVILLE GAS AND ELECTRIC WILL BE INSTALLING FGD SYSTEMS ON TWO OF THE FOUR BOILERS AT THE UTILITY'S PLANNED TRIMBLE COUNTY STATION IN BEDFORD, KENTUCKY. THE PULVERIZED 4% S (IF NO COAL WASH IS INCLUDED) COAL FIRED UNITS' FLUE GAS WILL BE CLEANED BY ESP'S AND WET SCRUBBING (90% REMOVAL EFFICIENCY). SLUDGE DISPOSAL STRATEGY IS UNDECIDED. UNIT 1 IS SCHEDULED FOR START UP IN JULY 1985.
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY 2 NEW 575.0 MW (GROSS) 575.0 MW (ESC) COAL 4.00 %S BITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 7/88	LOUISVILLE GAS AND ELECTRIC WILL BE INSTALLING FGD SYSTEMS ON TWO OF THE FOUR BOILERS AT THE UTILITY'S PLANNED TRIMBLE COUNTY STATION IN BEDFORD, KENTUCKY. THE PULVERIZED 4% S (IF NO COAL WASH IS INCLUDED) COAL FIRED UNITS' FLUE GAS WILL BE CLEANED BY ESP'S AND WET SCRUBBING (90% REMOVAL EFFICIENCY). SLUDGE DISPOSAL STRATEGY IS UNDECIDED. UNIT 2 IS SCHEDULED FOR START UP IN 1988.
MARQUETTE BOARD OF LIGHT & PWR SHIRAS 3 NEW 44.0 MW (GROSS) 44.0 MW (ESC) COAL ***** %S LIME/SPRAY DRYING VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 10/82	SHIRAS 3 OF THE MARQUETTE BOARD OF LIGHT AND POWER IS A PULVERIZED COAL FIRED BOILER PLANNED FOR LOCATION IN MARQUETTE, MICHIGAN. PRESENTLY, THE UTILITY IS REQUESTING BIDS FOR A DRY LIME SCRUBBING PROCESS TO CONTROL EMISSIONS. THE UTILITY WILL UTILIZE A FABRIC FILTER TO OBTAIN A PARTICLE REMOVAL EFFICIENCY OF 99.8%. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN OCTOBER 1982.
MICHIGAN SO CENTRAL PWR AGENCY PROJECT 1 NEW 55.0 MW (GROSS) 55.0 MW (ESC) COAL 2.25 %S LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/82	THE PROJECT 1 UNIT OF MICHIGAN SOUTH CENTRAL POWER AGENCY IS TO BE CONSTRUCTED IN LITCHFIELD, MICHIGAN, AND WILL UTILIZE A WET LIMESTONE FGD PROCESS. THE PULVERIZED COAL FIRED BOILER WILL FEED ITS FLUE GAS THROUGH A HOT SIDE ESP FOLLOWED BY A BABCOCK AND WILCOX LIMESTONE SPRAY TOWER. THE CLEANED GAS WILL PASS THROUGH A MIST ELIMINATOR BEFORE BEING WARMED BY AN IN-LINE REHEATER AND EXITING A 250 FOOT STACK. THE SLUDGE IS TO BE DISPOSED OFF SITE. START UP IS SCHEDULED FOR JUNE 1982.
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE 5 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/90	UNIT 1 OF THE ARKANSAS ENERGY LIGNITE CENTER IS A LIGNITE (.5% S) FIRED BOILER. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1990.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE 6 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/92	UNIT 2 OF THE ARKANSAS ENERGY LIGNITE CENTER IS A LIGNITE (.5% S) FIRED BOILER. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1992.
MIDDLE SOUTH UTILITIES UNASSIGNED 1 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/89	MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. THE PLANT NAME HAS NOT BEEN ASSIGNED. THE PLANT WILL BE LOCATED SOMEWHERE IN LOUISIANA. STARTUP IS SCHEDULED FOR 1989.
MIDDLE SOUTH UTILITIES UNASSIGNED 2 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/93	MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL EMISSIONS. THE PLANT NAME HAS NOT BEEN ASSIGNED. THE PLANT WILL BE LOCATED SOMEWHERE IN LOUISIANA. STARTUP IS SCHEDULED FOR 1993.
MIDDLE SOUTH UTILITIES WILTON 1 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/88	WILTON 1 IS A COAL (.50% S) FIRED BOILER TO BE LOCATED IN CONVENT, LOUISIANA. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM FOR EMISSION CONTROL. STARTUP IS SCHEDULED FOR 1988.
MIDDLE SOUTH UTILITIES WILTON 2 NEW 890.0 MW (GROSS) 890.0 MW (ESC) COAL .50 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 0/91	WILTON 2 IS A COAL (.50% S) FIRED BOILER TO BE LOCATED IN CONVENT, LOUISIANA. MIDDLE SOUTH UTILITIES HAS SIGNED A LETTER OF INTENT WITH COMBUSTION ENGINEERING FOR A WET LIMESTONE SCRUBBING SYSTEM FOR EMISSION CONTROL. STARTUP IS SCHEDULED FOR 1991.
MINNESOTA POWER & LIGHT CLAY BOSWELL 4 NEW 554.0 MW (GROSS) 475.0 MW (ESC) COAL .94 %S SUBBITUMINOUS LIME/ALKALINE FLYASH PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 4/80	CLAY BOSWELL 4 OF MINNESOTA POWER AND LIGHT IS A SUBBITUMINOUS COAL (0.94% S, 8896 BTU/LB) FIRED UNIT LOCATED IN COHASSET, MINNESOTA. PEABODY PROCESS SYSTEMS HAS SUPPLIED A LIME/ALKALINE FLYASH SYSTEM WHICH IS DESIGNED TO REMOVE 64.6% OF THE SO2 IN THE FLUE GAS. TWO HOT SIDE ESP'S ARE FOLLOWED BY VENTURI/SPRAY TOWER TRAINS. MIST ELIMINATION IS PROVIDED BY A SIEVE TRAY FOLLOWED BY A SPIN VANE CHEVRON, AND REHEAT IS SUPPLIED BY BYPASSING 5% OF THE FLUE GAS. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE, AND THE SLUDGE IS DISPOSED IN A LINED POND. OPERATIONS COMMENCED IN APRIL 1980.

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UNIT IDENTIFICATION	ABSTRACT
MINNKOTA POWER COOPERATIVE MILTON R. YOUNG 2 NEW 440.0 MW (GROSS) 185.0 MW (ESC) COAL .70 %S LIGNITE LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 9/77	MINNKOTA POWER COOPERATIVE'S MILTON R. YOUNG 2 IS A CYCLONE FIRED LIGNITE (0.70%S, 6500 BTU/LB) BOILER LOCATED IN CENTER, NORTH DAKOTA. THE BOILER PRODUCES 2,021,400 ACFM OF FLUE GAS, HALF OF WHICH IS CLEANED BY TWO ESP'S AND TWO ADL/COMBUSTION EQUIPMENT ASSOCIATES LIME/ALKALINE FLYASH SPRAY TOWERS (75% DESIGN SO2 REMOVAL EFFICIENCY). THE CLEANED GAS PASSES THROUGH A CHEVRON MIST ELIMINATOR BEFORE IT JOINS A 15% BYPASS REHEAT, ALONG WITH THE UNSCRUBBED GAS, EXITS A 550 FOOT STACK. THE WATER LOOP IS OPEN, AND TH SLUDGE IS TRUCKED TO AN OFF-SITE MINEFILL. OPERATIONS BEGAN IN 1977.
MONONGAHELA POWER PLEASANTS 1 NEW 618.0 MW (GROSS) 618.0 MW (ESC) COAL 3.70 %S BITUMINOUS LIME BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 3/79	MONONGAHELA POWER PLEASANTS 1 IS A BITUMINOUS COAL (3.70% S, 12,150 BTU/LB) FIRED BOILER IN BELMONT, WEST VIRGINIA. BABCOCK AND WILCOX SUPPLIED A LIME FGD SYSTEM DESIGNED TO REMOVE 90% OF THE FLUE GAS SO2 FROM THIS UNIT. THE EMISSION CONTROL SYSTEM INCLUDES AN ESP UPSTREAM OF FOUR SPRAY TOWER ABSORBERS. A FLUE GAS BYPASS SYSTEM PROVIDES REHEAT OF THE CLEANED GAS BEFORE IT IS DISCHARGED THROUGH A 1200 FOOT PLACITE LINED STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP. THE FGD SYSTEM ON THIS UNIT HAS BEEN OPERATIONAL SINCE MARCH 1979.
MONONGAHELA POWER PLEASANTS 2 NEW 618.0 MW (GROSS) 618.0 MW (ESC) COAL 4.50 %S BITUMINOUS LIME BABCOCK & WILCOX ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 10/80	MONONGAHELA POWER PLEASANTS 2 IS A BITUMINOUS COAL (4.5% S, 12,150 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN BELMONT, WEST VIRGINIA. BABCOCK AND WILCOX IS SUPPLYING A LIME FGD SYSTEM DESIGNED TO REMOVE 90% OF THE BOILER FLUE GAS SO2. THE EMISSION CONTROL SYSTEM ON THIS UNIT WILL INCLUDE AN ESP UPSTREAM OF FOUR SPRAY TOWER ABSORBERS. A FLUE GAS BYPASS SYSTEM WILL PROVIDE REHEAT OF THE CLEANED GAS BEFORE IT IS DISCHARGED THROUGH A 1200 FOOT PLACITE LINED STACK. THE SYSTEM WILL OPERATE IN AN OPEN WATER LOOP. FGD SYSTEM START UP IS EXPECTED IN OCTOBER 1980.
MONTANA POWER COLSTRIP 1 NEW 360.0 MW (GROSS) 360.0 MW (ESC) COAL .77 %S SUBBITUMINOUS LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: 3.3% STATUS 1 STARTUP 9/75	COLSTRIP 1 OF MONTANA POWER IS A SUBBITUMINOUS COAL (0.77% S, 8843 BTU/LB) FIRED UNIT LOCATED IN COLSTRIP, MONTANA. ADL/COMBUSTION EQUIPMENT ASSOCIATES SUPPLIED A LIME/ALKALINE FLYASH FGD SYSTEM CONSISTING OF THREE VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS. THE ABSORBERS ARE FOLLOWED BY HORIZONTAL CHEVRON MIST ELIMINATORS, A STEAM TUBE REHEATER, AND A 500 FOOT STACK. THE UNSTABILIZED SLUDGE IS DISPOSED IN AN ON-SITE LINED POND. THE WATER LOOP IS CLOSED. OPERATIONS INITIALLY BEGAN IN SEPTEMBER 1975.
MONTANA POWER COLSTRIP 2 NEW 360.0 MW (GROSS) 360.0 MW (ESC) COAL .77 %S SUBBITUMINOUS LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: 3.3% STATUS 1 STARTUP 5/76	COLSTRIP 2 OF MONTANA POWER IS A SUBBITUMINOUS COAL (0.77% S, 8843 BTU/LB) FIRED UNIT LOCATED IN COLSTRIP, MONTANA. ADL/COMBUSTION EQUIPMENT ASSOCIATES SUPPLIED A LIME/ALKALINE FLYASH FGD SYSTEM CONSISTING OF THREE VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS. THE ABSORBERS ARE FOLLOWED BY HORIZONTAL CHEVRON MIST ELIMINATORS, A STEAM TUBE REHEATER, AND A 500 FOOT STACK. THE UNSTABILIZED SLUDGE IS DISPOSED IN AN ON-SITE LINED POND. THE WATER LOOP IS CLOSED. OPERATIONS INITIALLY BEGAN IN MAY 1976.
MONTANA POWER COLSTRIP 3 NEW 700.0 MW (GROSS) 700.0 MW (ESC) COAL .70 %S LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 5/83	MONTANA POWER'S COLSTRIP 3 IS A LOW SULFUR COAL (0.7% S, 8800 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN COLSTRIP, MONTANA. A CONTRACT HAS BEEN AWARDED TO ADL/COMBUSTION EQUIPMENT ASSOCIATES FOR A LIME/ALKALINE FLYASH FGD SYSTEM ON THIS UNIT. START UP IS SCHEDULED FOR 1983.

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UNIT IDENTIFICATION	ABSTRACT
MONTANA POWER COLSTRIP 4 NEW 700.0 MW (GROSS) 700.0 MW (ESC) COAL .70 %S LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 3/84	MONTANA POWER'S COLSTRIP 4 IS A LOW SULFUR COAL (0.7% S, 8800 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN COLSTRIP, MONTANA. A CONTRACT HAS BEEN AWARDED TO ADL/COMBUSTION EQUIPMENT ASSOCIATES FOR A LIME/ALKALINE FLYASH FGD SYSTEM ON THIS UNIT. START UP IS SCHEDULED FOR 1984.
MONTANA-DAKOTA UTILITIES COYOTE 1 NEW 440.0 MW (GROSS) 440.0 MW (ESC) COAL .87 %S LIGNITE SODIUM CARBONATE/SPRAY DRYING WHEELABRATOR-FRYE/R.I. ENERGY CONSUMPTION: 1.1% STATUS 2 STARTUP 3/81	COYOTE 1 IS A CYCLONE FIRED PULVERIZED LIGNITE (0.87% S, 7050 BTU/LB) BOILER UNDER CONSTRUCTION IN BEULAH, NORTH DAKOTA. THIS UNIT IS JOINTLY OWNED BY FIVE UTILITIES, WITH MONTANA-DAKOTA UTILITIES BEING THE MAJOR OWNER AND CONSTRUCTOR. A SODIUM CARBONATE DRY FGD SYSTEM DESIGNED TO REMOVE 70% OF THE SO2 IS BEING SUPPLIED BY WHEELABRATOR-FRYE AND ROCKWELL INTERNATIONAL. THE SPRAY DRYER/BAGHOUSE SYSTEM IS SCHEDULED TO START UP IN 1981.
MUSCATINE POWER & WATER MUSCATINE 9 NEW 166.0 MW (GROSS) 166.0 MW (ESC) COAL 3.00 %S BITUMINOUS LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 4.8% STATUS 3 STARTUP 9/82	MUSCATINE 9 IS A PULVERIZED BITUMINOUS COAL (3% S, 11,200 BTU/LB) FIRED UNIT PLANNED BY MUSCATINE POWER AND WATER TO BE LOCATED IN MUSCATINE, IOWA. A CONTRACT WAS AWARDED TO RESEARCH COTTRELL FOR A LIMESTONE UNIT FOR EMISSION CONTROL. THE FGD SYSTEM WILL FEATURE AN ESP, TWO 100% CAPACITY TOWERS, STEAM COIL REHEAT, A CLOSED WATER LOOP, AND FORCED OXIDATION OF THE SLUDGE BEFORE LANDFILL. THE DESIGN SO2 REMOVAL WILL BE 94%. START UP WILL TAKE PLACE IN 1982.
NEBRASKA PUBLIC POWER DISTRICT FOSSIL III 1 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL .36 %S SUBBITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 3/87	FOSSIL III 1 IS A PULVERIZED SUBBITUMINOUS COAL (0.36% S, 8500 BTU/LB) FIRED UNIT PLANNED BY THE NEBRASKA PUBLIC POWER DISTRICT TO BE LOCATED NEAR SARGENT, NEBRASKA. THE UTILITY IS CONSIDERING A DRY SCRUBBING FGD PROCESS TO CONTROL EMISSIONS FROM THE 650 MW BOILER. STARTUP FOR THE UNIT IS SCHEDULED FOR 1987.
NEVADA POWER HARRY ALLEN 1 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/86	NEVADA POWER'S HARRY ALLEN 1 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE 1986.
NEVADA POWER HARRY ALLEN 2 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/87	NEVADA POWER'S HARRY ALLEN 2 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE 1987.

UNIT IDENTIFICATION	ABSTRACT
NEVADA POWER HARRY ALLEN 3 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/88	NEVADA POWER'S HARRY ALLEN 3 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE 1988.
NEVADA POWER HARRY ALLEN 4 NEW 500.0 MW (GROSS) 500.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 6/89	NEVADA POWER'S HARRY ALLEN 4 IS A PLANNED COAL FIRED UNIT TO BE LOCATED IN LAS VEGAS, NEVADA. THE UTILITY IS CONSIDERING A HOT SIDE ESP IN CONJUNCTION WITH AN FGD SYSTEM. SPECIFICATIONS HAVE NOT YET BEEN PREPARED. START UP IS SCHEDULED FOR JUNE 1989.
NEVADA POWER REID GARDNER 1 RETROFIT 125.0 MW (GROSS) 125.0 MW (ESC) COAL .50 %S BITUMINOUS SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 3/74	REID GARDNER 1 IS A WET BOTTOM LOW SULFUR COAL (0.5% S, 12,450 BTU/LB) FIRED UNIT OWNED BY NEVADA POWER, LOCATED IN MOAPA, NEVADA. A SODIUM CARBONATE-BASED (TRONA) SCRUBBING SYSTEM BY ADL/COMBUSTION EQUIPMENT ASSOCIATES CONSISTS OF ONE MODULE CONTAINING TWIN VARIABLE THROAT VENTURIS FOLLOWED BY A SEPARATOR IN SERIES WITH A SINGLE STAGE PEFORATED PLATE WASH TOWER. PRIMARY PARTICULATE CONTROL IS PROVIDED BY UPSTREAM MULTICLONES. A RADIAL VANE MIST ELIMINATOR PRECEDES AN INDIRECT STEAM HOT AIR REHEATER AND A 200 FOOT STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED SOLAR EVAPORATION POND. THE DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM HAS BEEN OPERATIONAL SINCE MARCH 1974.
NEVADA POWER REID GARDNER 2 RETROFIT 125.0 MW (GROSS) 125.0 MW (ESC) COAL .50 %S BITUMINOUS SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/74	REID GARDNER 2 IS A WET BOTTOM LOW SULFUR COAL (0.5% S, 12,450 BTU/LB) FIRED UNIT OWNED BY NEVADA POWER, LOCATED IN MOAPA, NEVADA. A SODIUM CARBONATE-BASED (TRONA) SCRUBBING SYSTEM BY ADL/COMBUSTION EQUIPMENT ASSOCIATES CONSISTS OF ONE MODULE CONTAINING TWIN VARIABLE THROAT VENTURIS FOLLOWED BY A SEPARATOR IN SERIES WITH A SINGLE STAGE PEFORATED PLATE WASH TOWER. PRIMARY PARTICULATE CONTROL IS PROVIDED BY UPSTREAM MULTICLONES. A RADIAL VANE MIST ELIMINATOR PRECEDES AN INDIRECT STEAM HOT AIR REHEATER AND A 200 FOOT STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED SOLAR EVAPORATION POND. THE DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL 1974.
NEVADA POWER REID GARDNER 3 NEW 125.0 MW (GROSS) 125.0 MW (ESC) COAL .50 %S BITUMINOUS SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 6/76	REID GARDNER 3 IS A WET BOTTOM LOW SULFUR COAL (0.5% S, 12,450 BTU/LB) FIRED UNIT OWNED BY NEVADA POWER, LOCATED IN MOAPA, NEVADA. A SODIUM CARBONATE-BASED (TRONA) SCRUBBING SYSTEM BY ADL/COMBUSTION EQUIPMENT ASSOCIATES CONSISTS OF ONE MODULE CONTAINING TWIN VARIABLE THROAT VENTURIS FOLLOWED BY A SEPARATOR IN SERIES WITH A SINGLE STAGE PEFORATED PLATE WASH TOWER. PRIMARY PARTICULATE CONTROL IS PROVIDED BY UPSTREAM MULTICLONES. A RADIAL VANE MIST ELIMINATOR PRECEDES AN INDIRECT STEAM HOT AIR REHEATER AND A 200 FOOT STACK. THE SYSTEM OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE CLAY LINED SOLAR EVAPORATION POND. THE DESIGN SO2 REMOVAL EFFICIENCY IS 90%. THE SYSTEM HAS BEEN OPERATIONAL SINCE JUNE 1976.
NEVADA POWER REID GARDNER 4 NEW 250.0 MW (GROSS) 250.0 MW (ESC) COAL .75 %S SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES ENERGY CONSUMPTION: ****% STATUS 4 STARTUP 4/83	REID GARDNER 4 OF NEVADA POWER IS A COAL (0.75% S, 12,450 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN MOAPA, NEVADA. A LETTER OF INTENT HAS BEEN SIGNED WITH COMBUSTION EQUIPMENT ASSOCIATES TO PROVIDE A SODIUM CARBONATE FGD SYSTEM. A BAGHOUSE WILL PRECEED THE FGD SYSTEM FOR PARTICLE CONTROL. CONSTRUCTION IS EXPECTED TO BEGIN IN 1980, AND START UP IS EXPECTED IN 1983.

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UNIT IDENTIFICATION	ABSTRACT
NEVADA POWER WARNER VALLEY 1 NEW 295.0 MW (GROSS) 295.0 MW (ESC) COAL 1.15 %S SUBBITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 6/85	NEVADA POWER'S WARNER VALLEY 1 IS A PLANNED COAL (1.15% S) FIRED UNIT TO BE LOCATED IN ST. GEORGE, UTAH. THE UTILITY IS CURRENTLY EVALUATING BIDS FOR AN FGD SYSTEM. NO ANNOUNCEMENTS HAVE YET BEEN MADE CONCERNING THE EMISSION CONTROL STRATEGY FOR THIS UNIT. START UP IS EXPECTED IN JUNE 1985.
NEVADA POWER WARNER VALLEY 2 NEW 295.0 MW (GROSS) 295.0 MW (ESC) COAL 1.15 %S SUBBITUMINOUS PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 6/86	NEVADA POWER'S WARNER VALLEY 2 IS A PLANNED COAL (1.15% S) FIRED UNIT TO TO BE LOCATED IN ST. GEORGE, UTAH. THE UTILITY IS CURRENTLY EVALUATING FOR AN FGD SYSTEM. NO ANNOUNCEMENTS HAVE YET BEEN MADE CONCERNING THE EMISSION CONTROL STRATEGY FOR THIS UNIT. START UP IS EXPECTED IN JUNE 1986.
NEW YORK STATE ELEC & GAS SOMERSET 1 NEW 625.0 MW (GROSS) 625.0 MW (ESC) COAL 2.20 %S BITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 6/84	THE SOMERSET 1 UNIT OF THE NEW YORK STATE ELECTRIC & GAS CORP. IS A PULVERIZED COAL BOILER LOCATED IN SOMERSET, NEW YORK. THE BOILER GENERATES A FLUE GAS FLOW OF 2,227,000 ACFM AND FIRES A BITUMINOUS COAL WITH AN AVERAGE SULFUR CONTENT OF 2.2% AND AN AVERAGE HEAT CONTENT OF 12,400 BTU/LB. A COLD SIDE ESP WITH A DESIGN EFFICIENCY OF 99.77% WILL PROVIDE THE PRIMARY PARTICULATE REMOVAL. A LIMESTONE ABSORBER WITH A DESIGN REMOVAL EFFICIENCY OF 90% WILL BE USED FOR SO2 REMOVAL. THE SYSTEM WILL OPERATE IN A CLOSED LOOP MODE. THE SLUDGE IS TO BE DEWATERED AND STABILIZED BEFORE BEING LANDFILLED. OPERATIONS ARE SCHEDULED FOR 1984.
NIAGARA MOHAWK POWER COOP CHARLES R. HUNTLEY 66 RETROFIT 100.0 MW (GROSS) 100.0 MW (ESC) COAL 1.80 %S AQUEOUS CARBONATE/SPRAY DRYING ROCKWELL INTERNATIONAL ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 4/82	CHARLES R. HUNTLEY 66 OF NIAGARA POWER COOP IS A PULVERIZED COAL (1.8% S, 12,500 BTU/LB) FIRED UNIT LOCATED IN BUFFALO, NEW YORK. A CONTRACT WAS AWARDED TO ROCKWELL INTERNATIONAL FOR THE DESIGN AND INSTALLATION OF A 90% EFFICIENT RETROFIT AQUEOUS CARBONATE FGD SYSTEM WHICH WILL PRODUCE ELEMENTAL SULFUR AS AN END PRODUCT. FUNDS ARE BEING PROVIDED BY THE U.S.EPA AND THE EMPIRE STATE ELECTRIC ENERGY RESEARCH CORP. A SPRAY DRYER WILL BE FOLLOWED BY TWO BANKS OF EIGHT CYCLONES AN ESP, AND A 200 FOOT STEEL LINED STACK. THE WATER LOOP WILL BE OPEN. START UP OF THE FGD SYSTEM WILL BE IN 1982.
NORTHERN INDIANA PUB SERVICE DEAN H. MITCHELL 11 RETROFIT 116.0 MW (GROSS) 115.0 MW (ESC) COAL 3.50 %S WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 12.1% STATUS 1 STARTUP 7/76	NORTHERN INDIANA PUBLIC SERVICE'S DEAN H. MITCHELL 11 IS A COAL (3.5% S, 11,000 BTU/LB) FIRED UNIT LOCATED IN GARY, INDIANA. A RETROFIT WELLMAN LORD FGD SYSTEM BY DAVY POWERGAS HAS BEEN OPERATING ON THIS UNIT SINCE JULY 1976. AN ESP IS FOLLOWED BY A VARIABLE THROAT VENTURI SCRUBBER AND A TRAY TOWER ABSORBER (90% DESIGN SO2 REMOVAL EFFICIENCY). A DIRECT COMBUSTION RAISES THE CLEANED GAS TEMPERATURE 50 DEG F BEFORE THE GAS IS DISCHARGED THROUGH A 166 FOOT STAINLESS STEEL AND FRP LINED STACK. ELEMENTAL SULFUR AND SULFATE IS PRODUCED BY THE PROCESS DEVELOPED BY ALLIED CHEMICAL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE.
NORTHERN INDIANA PUB SERVICE SCHAHFER 17 NEW 421.0 MW (GROSS) 421.0 MW (ESC) COAL 3.20 %S BITUMINOUS DUAL ALKALI FMC ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/83	SCHAHFER 17 OF NORTHERN INDIANA PUBLIC SERVICE IS A 3.2% SULFUR COAL FIRED UNIT PLANNED FOR CONSTRUCTION IN WHEATFIELD, INDIANA. THE UTILITY HAS AWARDED A CONTRACT TO FMC FOR THE INSTALLATION OF A DUAL ALKALI FGD SYSTEM AT THIS UNIT. PARTICULATE MATTER WILL BE COLLECTED BY AN ESP AND THE SYSTEM WILL INCLUDE A REHEATER. START UP OF THIS UNIT IS SCHEDULED FOR JUNE 1983.

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UNIT IDENTIFICATION	ABSTRACT
NORTHERN INDIANA PUB SERVICE SCHAHFER 18 NEW 421.0 MW (GROSS) 421.0 MW (ESC) COAL 3.20 %S BITUMINOUS DUAL ALKALI FMC ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/85	SCHAHFER 18 OF NORTHERN INDIANA PUBLIC SERVICE IS A 3.2% SULFUR COAL FIRED UNIT PLANNED FOR CONSTRUCTION IN WHEATFIELD, INDIANA. THE UTILITY HAS AWARDED A CONTRACT TO FMC FOR THE INSTALLATION OF A DUAL ALKALI FGD SYSTEM AT THIS UNIT. PARTICULATE MATTER WILL BE COLLECTED BY AN ESP AND THE SYSTEM WILL INCLUDE A REHEATER. START UP OF THIS UNIT IS SCHEDULED FOR JUNE 1985.
NORTHERN STATES POWER RIVERSIDE 6,7 RETROFIT 110.0 MW (GROSS) 110.0 MW (ESC) COAL 1.20 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 11/80	RIVERSIDE 6 AND 7 ARE TWO COAL FIRED BOILERS OWNED BY NORTHERN STATES POWER AND LOCATED IN MINNEAPOLIS, MINNESOTA. EACH BOILER GENERATES A FLUE GAS FLOW OF 340,000 ACFM AT 350 F. CURRENTLY, A DEMONSTRATION LIME/SPRAY DRYING FGD SYSTEM IS UNDER CONSTRUCTION THAT WILL BE CAPABLE OF TREATING THE FLUE GAS FROM BOTH BOILERS. THE SYSTEM IS BEING SUPPLIED BY NIRO ATOMIZER/JOY MANUFACTURING AND WILL CONSIST OF A SPRAY DRYER FOLLOWED BY A BAGHOUSE. THE CLEAN FLUE GAS WILL BE VENTED TO TWO 275 FT CONCRETE STACKS WITH FIRE BRICK LINERS. SPENT ABSORBENT WILL BE DISPOSED OF IN ON AND OFF SITE LANDFILLS. STARTUP IS SCHEDULED FOR NOVEMBER 1980.
NORTHERN STATES POWER SHERBURNE 1 NEW 740.0 MW (GROSS) 740.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.7% STATUS 1 STARTUP 3/76	NORTHERN STATES POWER'S SHERBURNE 1 IS A BALANCED DRAFT PULVERIZED SUBBITUMINOUS COAL (0.80% S, 8500 BTU/LB) FIRED BOILER IN BECKER, MINNESOTA. A 50% EFFICIENT (DESIGN) LIMESTONE/ALKALINE FLYASH FGD SYSTEM SUPPLIED BY COMBUSTION ENGINEERING HAS BEEN OPERATIONAL ON THIS UNIT SINCE MARCH 1976. TWELVE VARIABLE THROAT ROD DECK VENTURI/MARBLE BED ABSORBER TRAINS ARE FOLLOWED BY ONE CHEVRON MIST ELIMINATORS/TRAIN, AN IN-LINE HOT WATER REHEATER, AND A 650 FOOT CORTEN LINED STACK. THE SLUDGE IS FORCIBLY OXIDIZED AND DISPOSED IN A CLAY LINED SETTLING POND. THE WATER LOOP IS OPEN.
NORTHERN STATES POWER SHERBURNE 2 NEW 740.0 MW (GROSS) 740.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING ENERGY CONSUMPTION: 2.7% STATUS 1 STARTUP 3/77	NORTHERN STATES POWER'S SHERBURNE 2 IS A BALANCED DRAFT PULVERIZED SUBBITUMINOUS COAL (0.80% S, 8500 BTU/LB) FIRED BOILER IN BECKER, MINNESOTA. A 50% EFFICIENT (DESIGN) LIMESTONE/ALKALINE FLYASH FGD SYSTEM SUPPLIED BY COMBUSTION ENGINEERING HAS BEEN OPERATIONAL ON THIS UNIT SINCE MARCH 1977. TWELVE VARIABLE THROAT ROD DECK VENTURI/MARBLE BED ABSORBER TRAINS ARE FOLLOWED BY ONE CHEVRON MIST ELIMINATORS/TRAIN, AN IN-LINE HOT WATER REHEATER, AND A 650 FOOT CORTEN LINED STACK. THE SLUDGE IS FORCIBLY OXIDIZED AND DISPOSED IN A CLAY LINED SETTLING POND. THE WATER LOOP IS OPEN.
PACIFIC GAS & ELECTRIC MONTEZUMA 1 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: 3.5% STATUS 6 STARTUP 6/89	MONTEZUMA 1 OF PACIFIC GAS AND ELECTRIC IS A COAL (0.8% S, 12,000 BTU/LB) FIRED BOILER PLANNED FOR COLLINSVILLE, CALIFORNIA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A BAGHOUSE AND A LIMESTONE FGD SYSTEM. SLUDGE WILL BE DISPOSED OF IN A LANDFILL. START UP DATE IS JUNE 1989.
PACIFIC GAS & ELECTRIC MONTEZUMA 2 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL .80 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: 3.5% STATUS 6 STARTUP 6/90	MONTEZUMA 2 OF PACIFIC GAS AND ELECTRIC IS A COAL (0.8% S, 12,000 BTU/LB) FIRED BOILER PLANNED FOR COLLINSVILLE, CALIFORNIA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A BAGHOUSE AND A LIMESTONE FGD SYSTEM. SLUDGE WILL BE DISPOSED OF IN A LANDFILL. START UP DATE IS JUNE 1990.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
PACIFIC POWER & LIGHT JIM BRIDGER 1 RETROFIT 550.0 MW (GROSS) 550.0 MW (ESC) COAL .56 %S SUBBITUMIOUS SODIUM CARBONATE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 0/88	PACIFIC POWER AND LIGHT'S JIM BRIDGER 1 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (0.56%S, 9300 BTU/LB.) FIRED BOILER LOCATED IN ROCK SPRINGS, WYOMING. THE UTILITY IS EVALUATING BIDS FOR A RETROFIT FGD SYSTEM FOR SO2 CONTROL. A WET, SODIUM CARBONATE SYSTEM, WHICH TREATS 2,700,000 ACFM OF FLUE GAS, IS BEING PLANNED. A COLD-SIDE ESP IS CURRENTLY IN OPERATION FOR PRIMARY PARTICULATE CONTROL. STARTUP IS SCHEDULED FOR 1988.
PACIFIC POWER & LIGHT JIM BRIDGER 2 RETROFIT 550.0 MW (GROSS) 550.0 MW (ESC) COAL .56 %S SUBBITUMIOUS SODIUM CARBONATE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 0/84	PACIFIC POWER AND LIGHT'S JIM BRIDGER 2 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (0.56%S, 9300 BTU/LB.) FIRED BOILER LOCATED IN ROCK SPRINGS, WYOMING. THE UTILITY IS EVALUATING BIDS FOR A RETROFIT FGD SYSTEM FOR SO2 CONTROL. A WET, SODIUM CARBONATE SYSTEM, WHICH TREATS 2,700,000 ACFM OF FLUE GAS, IS BEING PLANNED. A COLD-SIDE ESP IS CURRENTLY IN OPERATION FOR PRIMARY PARTICULATE CONTROL. STARTUP IS SCHEDULED FOR 1984.
PACIFIC POWER & LIGHT JIM BRIDGER 3 RETROFIT 550.0 MW (GROSS) 550.0 MW (ESC) COAL .56 %S SUBBITUMIOUS SODIUM CARBONATE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 0/86	PACIFIC POWER AND LIGHT'S JIM BRIDGER 3 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (0.56%S, 9300 BTU/LB.) FIRED BOILER LOCATED IN ROCK SPRINGS, WYOMING. THE UTILITY IS EVALUATING BIDS FOR A RETROFIT FGD SYSTEM FOR SO2 CONTROL. A WET, SODIUM CARBONATE SYSTEM, WHICH TREATS 2,700,000 ACFM OF FLUE GAS, IS BEING PLANNED. A COLD-SIDE ESP IS CURRENTLY IN OPERATION FOR PRIMARY PARTICULATE CONTROL. STARTUP IS SCHEDULED FOR 1986.
PACIFIC POWER & LIGHT JIM BRIDGER 4 NEW 550.0 MW (GROSS) 550.0 MW (ESC) COAL .56 %S SUBBITUMINOUS SODIUM CARBONATE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: .2% STATUS 1 STARTUP 9/79	PACIFIC POWER AND LIGHT'S JIM BRIDGER 4 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (0.56% S, 9300 BTU/LB) FIRED BOILER LOCATED IN ROCK SPRINGS, WYOMING. A 91% EFFICIENT SODIUM CARBONATE FGD SYSTEM FOR THIS UNIT WAS SUPPLIED BY THE AIR CORRECTION DIVISION OF UOP. A COLD SIDE ESP TREATS 2,720,000 ACFM OF FLUE GAS, FOLLOWED BY THREE SIEVE TRAY ABSORBERS. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. A SYSTEM CHECK OUT WAS CONDUCTED IN JULY 1979, AND OPERATIONS BEGAN IN SEPTEMBER 1979.
PENNSYLVANIA POWER BRUCE MANSFIELD 1 NEW 917.0 MW (GROSS) 917.0 MW (ESC) COAL 3.00 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 6.0% STATUS 1 STARTUP 12/75	BRUCE MANSFIELD 1 OF PENNSYLVANIA POWER IS A SUPERCRITICAL, BALANCED DRAFT BOILER FIRING PULVERIZED COAL (3.0% S, 11,500 BTU/LB) IN SHIPPINGPORT, PENNSYLVANIA. A CHEMICO THIOSORBIC LIME FGD SYSTEM WAS DESIGNED TO REMOVE FLYASH AND SO2 (92.1%) FROM 3,350,000 ACFM OF FLUE GAS. THE FGD SYSTEM CONSISTS OF SIX VARIABLE THROAT VENTURI SCRUBBERS FOLLOWED BY SIX FIXED THROAT VENTURI ABSORBERS, HORIZONTAL MIST ELIMINATORS, TWO DIRECT COMBUSTION REHEATERS, AND A 950 FOOT FLAKEGLASS STACK SHARED BY UNITS 1 AND 2. THE WATER LOOP IS OPEN, AND THE CALCILOX STABILIZED SLUDGE IS DISPOSED IN AN OFF SITE LANDFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE DECEMBER 1975.
PENNSYLVANIA POWER BRUCE MANSFIELD 2 NEW 917.0 MW (GROSS) 917.0 MW (ESC) COAL 3.00 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 6.0% STATUS 1 STARTUP 7/77	BRUCE MANSFIELD 2 OF PENNSYLVANIA POWER IS A SUPERCRITICAL, BALANCED DRAFT BOILER FIRING PULVERIZED COAL (3.0% S, 11,500 BTU/LB) IN SHIPPINGPORT, PENNSYLVANIA. A CHEMICO THIOSORBIC LIME FGD SYSTEM WAS DESIGNED TO REMOVE FLYASH AND SO2 (92.1%) FROM 3,350,000 ACFM OF FLUE GAS. THE FGD SYSTEM CONSISTS OF SIX VARIABLE THROAT VENTURI SCRUBBERS FOLLOWED BY SIX FIXED THROAT VENTURI ABSORBERS, HORIZONTAL MIST ELIMINATORS, TWO DIRECT COMBUSTION REHEATERS, AND A 950 FOOT FLAKEGLASS STACK SHARED BY UNITS 1 AND 2. THE WATER LOOP IS OPEN, AND THE CALCILOX STABILIZED SLUDGE IS DISPOSED IN AN OFF SITE LANDFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE JULY 1977.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
PENNSYLVANIA POWER BRUCE MANSFIELD 3 NEW 917.0 MW (GROSS) 917.0 MW (ESC) COAL 3.00 %S LIME PULLMAN KELLOGG ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 6/80	BRUCE MANSFIELD 3 OF PENNSYLVANIA POWER IS A SUPERCRITICAL PULVERIZED COAL (3.0% S, 11,500 BTU/LB) FIRED BOILER LOCATED IN SHIPPINGPORT, PENNSYLVANIA. FOUR ESP'S TREAT 3,308,000 ACFM OF FLUE GAS, FOLLOWED BY FIVE (ONE SPARE) PULLMAN KELLOGG THIOSORBIC LIME ABSORBERS WHICH REMOVE 92.2% OF THE SO2. THE CLEANED GAS PASSES THROUGH CHEVRON MIST ELIMINATORS AND DIRECT COMBUSTION REHEATERS BEFORE DISCHARGE THROUGH A 600 FOOT INCONEL 625 LINED STACK. THE FLYASH STABILIZED SLUDGE IS PIPED TO THE EXISTING OFF SITE LANDFILL PRESENTLY USED BY UNITS ONE AND TWO. OPERATIONS COMMENCED IN JUNE, 1980.
PHILADELPHIA ELECTRIC CROMBY 1 RETROFIT 150.0 MW (GROSS) 150.0 MW (ESC) COAL 3.00 %S MAGNESIUM OXIDE UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 5/83	PHILADELPHIA ELECTRIC HAS PLANS FOR THE RETROFIT OF AN FGD SYSTEM ON ONE OF THE TWO 3.0% SULFUR COAL FIRED BOILERS AT CROMBY STATION IN PHOENIXVILLE, PENNSYLVANIA. A CONTRACT HAS BEEN AWARDED TO UNITED ENGINEERS FOR A MAGNESIUM OXIDE SYSTEM. THE START UP DATE IS SET FOR 1983.
PHILADELPHIA ELECTRIC EDDYSTONE 1 RETROFIT 240.0 MW (GROSS) 240.0 MW (ESC) COAL 2.60 %S MAGNESIUM OXIDE UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 12/82	UNIT 1 OF PHILADELPHIA ELECTRIC'S EDDYSTONE, PENNSYLVANIA STATION IS A BITUMINOUS COAL (2.6% S, 13,600 BTU/LB) FIRED UNIT WHICH USES ESP'S, MECHANICAL COLLECTORS, AND THREE PARTICLE SCRUBBERS (TWO ROD DECK SPRAY TOWERS AND ONE VENTURI) FOR PRIMARY PARTICLE CONTROL. THE UNIT 1 FGD SYSTEM WILL FOLLOW THE TWO ROD DECK SPRAY TOWERS. UNITED ENGINEERS IS SUPPLYING A MAGNESIUM OXIDE FGD SYSTEM FOR SO2 EMISSION CONTROL SIMILAR TO THE MAGNESIUM OXIDE PROTOTYPE SYSTEM THAT WAS PREVIOUSLY OPERATED AT THIS UNIT. OPERATIONS ARE SCHEDULED TO COMMENCE IN 1982.
PHILADELPHIA ELECTRIC EDDYSTONE 2 RETROFIT 334.0 MW (GROSS) 334.0 MW (ESC) COAL 2.50 %S MAGNESIUM OXIDE UNITED ENGINEERS ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 12/82	EDDYSTONE 2 OF PHILADELPHIA ELECTRIC IS A 2.5% SULFUR COAL FIRED BOILER LOCATED IN EDDYSTONE, PENNSYLVANIA. THE PLANT'S GENERATING CAPACITY IS 334 MW. UNITED ENGINEERS WILL SUPPLY A MAGNESIUM OXIDE FGD SYSTEM FOR EMISSION CONTROL. START UP IS SET FOR DECEMBER 1982.
PLAINS ELECTRIC G & T COOP PLAINS ESCALANTE 1 NEW 233.0 MW (GROSS) 233.0 MW (ESC) COAL .60 %S SUBBITUMINOUS LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 12/83	PLAINS ESCALANTE 1 IS A PULVERIZED SUBBITUMINOUS COAL FIRED UNIT PLANNED BY PLAINS ELECTRIC G & T COOPERATIVE TO BE LOCATED IN PREWITT, NEW MEXICO. THE 233 MW UNIT WILL UTILIZE A WET LIMESTONE SCRUBBING PROCESS FOR SO2 REMOVAL AND A FABRIC FILTER FOR PRIMARY PARTICLE CONTROL. A CONTRACT HAS BEEN AWARDED TO COMBUSTION ENGINEERING FOR THE WET LIMESTONE SYSTEM. THE UNIT INITIAL STARTUP IS PROJECTED FOR DECEMBER 1983.
PLATTE RIVER POWER AUTHORITY RAWHIDE 1 NEW 279.0 MW (GROSS) 279.0 MW (ESC) COAL .25 %S BITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: .0% STATUS 3 STARTUP 12/83	THE PLATTE RIVER POWER AUTHORITY HAS PLANS TO CONSTRUCT RAWHIDE 1, IN FT. COLLINS, COLORADO. THE 279 MW PULVERIZED COAL (0.25% S, 8702 BTU/LB) FIRED BOILER WILL BE SUPPLIED BY COMBUSTION ENGINEERING. A CONTRACT HAS BEEN AWARDED TO JOY MANUFACTURING/NIRO ATOMIZER FOR A DRY LIME SCRUBBING SYSTEM FOR EMISSION CONTROL. THE UTILITY IS CONSIDERING IRRIGATION DITCHES FOR LIQUID WASTE DISPOSAL. THE UNIT IS SCHEDULED TO GO ON LINE IN DECEMBER 1983.

UNIT IDENTIFICATION	ABSTRACT
PUBLIC SERVICE INDIANA GIBSON 5 NEW 650.0 MW (GROSS) 650.0 MW (ESC) COAL 3.30 %S LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 0/82	GIBSON 5 OF PUBLIC SERVICE OF INDIANA IS A 3.3% SULFUR COAL FIRED UNIT UNDER CONSTRUCTION IN PRINCETON, INDIANA. A CONTRACT WAS AWARDED TO PULLMAN KELLOGG FOR A LIMESTONE FGD SYSTEM CONSISTING OF FOUR KELLOGG-WEIR ABSORBER-REACTOR MODULES. SYSTEM START UP IS EXPECTED IN 1982. THE SYSTEM WILL USE KELLOGG'S PROPRIETARY MAGNESIUM-PROMOTED LIMESTONE.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 1 RETROFIT 361.0 MW (GROSS) 361.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 4.4% STATUS 1 STARTUP 4/78	SAN JUAN 1 OF PUBLIC SERVICE OF NEW MEXICO IN WATERFLOW, NEW MEXICO IS A COAL (0.8% S, 8100 BTU/LB) FIRED BOILER WHICH SUPPLIES 1,319,000 ACFM OF FLUE GAS TO A RETROFIT WELLMAN LORD FGD SYSTEM BY DAVY POWERGAS. THE EMISSION CONTROL SYSTEM, OPERATIONAL SINCE APRIL 1978, CONSISTS OF A HOT SIDE ESP FOLLOWED BY FOUR (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS WHICH WERE DESIGNED TO REMOVE 85% OF THE FLUE GAS SO2. AN INDIRECT HOT AIR REHEATER PRECEDES A BRICK LINED STACK. END PRODUCT ELEMENTAL SULFUR IS PRODUCED BY THE ALLIED CHEMICAL PROCESS. THE WATER LOOP IS CLOSED.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 2 RETROFIT 350.0 MW (GROSS) 350.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 4.6% STATUS 1 STARTUP 8/78	SAN JUAN 2 OF PUBLIC SERVICE OF NEW MEXICO IN WATERFLOW, NEW MEXICO IS A COAL (0.8% S, 8100 BTU/LB) FIRED BOILER WHICH SUPPLIES 1,319,000 ACFM OF FLUE GAS TO A RETROFIT WELLMAN LORD FGD SYSTEM BY DAVY POWERGAS. THE EMISSION CONTROL SYSTEM, OPERATIONAL SINCE AUGUST 1978, CONSISTS OF A HOT SIDE ESP FOLLOWED BY FOUR (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER TRAINS WHICH WERE DESIGNED TO REMOVE 85% OF THE FLUE GAS SO2. AN INDIRECT HOT AIR REHEATER PRECEDES A BRICK LINED STACK. END PRODUCT ELEMENTAL SULFUR IS PRODUCED BY THE ALLIED CHEMICAL PROCESS. THE WATER LOOP IS CLOSED.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 3 NEW 534.0 MW (GROSS) 534.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 3.6% STATUS 1 STARTUP 12/79	SAN JUAN 3 IS A COAL (0.8% S, 8100 BTU/LB) FIRED UNIT OF THE PUBLIC SERVICE OF NEW MEXICO AND IS LOCATED IN WATERFLOW, NEW MEXICO. THE FGD SYSTEM, SUPPLIED BY DAVY POWERGAS IS AN INTEGRATION OF THE WELLMAN LORD SO2 RECOVERY PROCESS AND ALLIED CHEMICAL'S SO2 REDUCTION TO SULFUR PROCESS. FIVE (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER (90% DESIGN SO2 REMOVAL) TRAINS FOLLOW A HOT SIDE ESP. AN INDIRECT HOT AIR REHEATER BOOSTS THE GAS TEMPERATURE 50 DEG F. THE SYSTEM OPERATES IN A CLOSED WATER LOOP MODE. OPERATIONS COMMENCED IN DECEMBER 1979.
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 4 NEW 534.0 MW (GROSS) 534.0 MW (ESC) COAL .80 %S SUBBITUMINOUS WELLMAN LORD DAVY MCKEE ENERGY CONSUMPTION: 3.6% STATUS 2 STARTUP 6/82	SAN JUAN 4 IS A COAL (0.8% S, 8100 BTU/LB) FIRED UNIT OF THE PUBLIC SERVICE OF NEW MEXICO UNDER CONSTRUCTION IN WATERFLOW, NEW MEXICO. THE FGD SYSTEM BEING SUPPLIED BY DAVY POWERGAS IS AN INTEGRATION OF THE WELLMAN LORD SO2 RECOVERY PROCESS AND ALLIED CHEMICAL'S SO2 REDUCTION TO SULFUR PROCESS. FIVE (ONE SPARE) VENTURI SCRUBBER/SPRAY TOWER ABSORBER (90% DESIGN SO2 REMOVAL) TRAINS WILL FOLLOW A HOT SIDE ESP. AN INDIRECT HOT AIR REHEATER WILL BOOST THE GAS TEMPERATURE 50 DEG F. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP IS EXPECTED IN JUNE 1982.
PWR AUTHORITY OF STATE OF NY FOSSIL NEW 700.0 MW (GROSS) 700.0 MW (ESC) COAL 3.00 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 4/87	THE POWER AUTHORITY OF NEW YORK PLANS A NEW 3.0% SULFUR COAL FIRED UNIT WHICH WILL BE LOCATED AT THE ARTHUR KILL FACILITY ON STATEN ISLAND. THE UTILITY IS PRESENTLY CONSIDERING FGD SYSTEMS FOR THIS UNIT. PUBLIC SERVICE COMMISSION HEARINGS ARE CURRENTLY IN PROGRESS. START UP IS EXPECTED IN APRIL 1987.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
SALT RIVER PROJECT CORONADO 1 NEW 350.0 MW (GROSS) 280.0 MW (ESC) COAL 1.00 %S SUBBITUMINOUS LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: 4.3% STATUS 1 STARTUP 11/79	SALT RIVER PROJECT'S CORONADO 1 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (1.0% S, 8300 BTU/LB) FIRED BOILER LOCATED IN ST. JOHNS, ARIZONA. PULLMAN KELLOGG SUPPLIED THE TWO LIMESTONE HORIZONTAL WEIR SPRAY TOWERS WHICH REMOVES 82.5% OF THE SO2 FROM THE FLUE GAS PASSED THROUGH THEM. VERTICAL HEIL MIST ELIMINATORS PRECEDE A 500 FOOT STACK. A MINIMUM OF 20% BYPASS PROVIDES REHEAT. THE WATER LOOP IS AN OPEN MODE, AND THE UNSTABILIZED SLUDGE IS DISPOSED IN AN UNLINED POND. START UP WAS IN NOVEMBER 1979.
SALT RIVER PROJECT CORONADO 2 NEW 350.0 MW (GROSS) 280.0 MW (ESC) COAL 1.00 %S SUBBITUMINOUS LIMESTONE PULLMAN KELLOGG ENERGY CONSUMPTION: 4.3% STATUS 1 STARTUP 7/80	SALT RIVER PROJECT'S CORONADO 2 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (1.0% S, 8300 BTU/LB) FIRED BOILER LOCATED IN ST. JOHNS, ARIZONA. PULLMAN KELLOGG SUPPLIED TWO LIMESTONE HORIZONTAL WEIR SPRAY TOWERS WHICH REMOVES 82.5% OF THE SO2 FROM THE FLUE GAS PASSED THROUGH THEM. VERTICAL HEIL MIST ELIMINATORS PRECEDE A 500 FOOT STACK. A MINIMUM OF 20% BYPASS PROVIDES REHEAT. THE WATER LOOP IS AN OPEN MODE, AND THE UNSTABILIZED SLUDGE IS DISPOSED IN AN UNLINED POND. START UP WAS IN JULY 1980.
SALT RIVER PROJECT CORONADO 3 NEW 400.0 MW (GROSS) 280.0 MW (ESC) COAL .60 %S SUBBITUMINOUS LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: 3.8% STATUS 6 STARTUP 0/89	CORONADO 3 IS A DRY BOTTOM PULVERIZED SUBBITUMINOUS COAL (.60% S, 8300 BTU/LB) FIRED UNIT PLANNED BY SALT RIVER PROJECT TO BE LOCATED IN ST. JOHN'S, ARIZONA. THE UTILITY IS PRESENTLY CONSIDERING THE INSTALLATION OF TWO HORIZONTAL SPRAY TOWERS UTILIZING LIMESTONE AS THE ABSORBENT. PLANS FOR AN EMISSION CONTROL SYSTEM HAVE NOT BEEN FINALIZED. THE SYSTEM WILL HAVE A 20% BYPASS REHEAT, AND THE SLUDGE WILL PROBABLY BE PONDED. SCHEDULED OPERATION DATE IS 1989.
SAN MIGUEL ELECTRIC COOP SAN MIGUEL 1 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL 1.70 %S LIGNITE LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 5.0% STATUS 2 STARTUP 11/80	SAN MIGUEL 1 OF THE SAN MIGUEL ELECTRIC COOP IS A LIGNITE (1.7% S, 5000 BTU/LB) FIRED RADIANT BOILER UNDER CONSTRUCTION IN SAN MIGUEL, TEXAS. THE EMISSION CONTROL SYSTEM ON THIS UNIT WILL CONSIST OF A COLD SIDE ESP FOLLOWED BY FOUR BABCOCK AND WILCOX 86% EFFICIENT LIMESTONE TCA MODULES. CHEVRON MIST ELIMINATORS WILL PRECEDE AN IN-LINE REHEATER AND AN ACID BRICK LINED STACK. THE WATER LOOP WILL BE CLOSED, AND THE DEWATERED SLURRY WILL BE MIXED WITH FLYASH BY RESEARCH COTTRELL AND DISPOSED IN AN OFF SITE LANDFILL. OPERATIONS ARE SCHEDULED TO COMMENCE IN NOVEMBER 1980.
SEMINOLE ELECTRIC SEMINOLE 1 NEW 620.0 MW (GROSS) 620.0 MW (ESC) COAL 2.75 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 3/83	SEMINOLE 1 OF SEMINOLE ELECTRIC IS A COAL (2.75% S, 11,700 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN PALATKA, FLORIDA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF ESP'S AND A LIMESTONE FGD SYSTEM. THE FGD SYSTEM WILL BE SUPPLIED BY PEABODY PROCESS SYSTEMS. START UP IS EXPECTED IN MARCH 1983.
SEMINOLE ELECTRIC SEMINOLE 2 NEW 620.0 MW (GROSS) 620.0 MW (ESC) COAL 2.75 %S SUBBITUMINOUS LIMESTONE PEABODY PROCESS SYSTEMS ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 3/85	SEMINOLE 2 OF SEMINOLE ELECTRIC IS A COAL (2.75% S, 11,700 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN PALATKA, FLORIDA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF ESP'S AND A LIMESTONE FGD SYSTEM. THE FGD SYSTEM WILL BE SUPPLIED BY PEABODY SYSTEMS. START UP IS EXPECTED IN MARCH 1985.

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UNIT IDENTIFICATION                                                  ABSTRACT
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SIERRA PACIFIC POWER              SIERRA PACIFIC POWER HAS PLANS TO CONSTRUCT A 276 MW UNIT TO BE LOCATED
VALMY                             IN VALMY, NEVADA.  THE FOSTER WHEELER PULVERIZED COAL FIRED BOILER AT THE
2                                 VALMY 2 STATION WILL UTILIZE AN FGD SYSTEM OR FIRE LOW SULFUR COAL TO
NEW         276.0 MW (GROSS)      CONTROL SO2 EMISSIONS.  IF FGD IS SELECTED, A DRY LIME SYSTEM WILL BE
            276.0 MW (ESC)        THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN AUGUST 1984.
COAL
***** %S
LIME/SPRAY DRYING
VENDOR NOT SELECTED
ENERGY CONSUMPTION: ****%
STATUS 7     STARTUP  8/84
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SIKESTON BRD OF MUNICIPAL UTIL THE SIKESTON BOARD OF MUNICIPAL UTILITIES' SIKESTON 1 IS A PULVERIZED COAL
SIKESTON                          (2.8% S, 11,340 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN SIKESTON, MIS-
1                                 SOURI. BABCOCK AND WILCOX IS SUPPLYING AN EMISSION CONTROL SYSTEM CONSIST-
NEW         235.0 MW (GROSS)      ING OF TWO ESP'S AND THREE 50% CAPACITY LIMESTONE VENTURI FGD MODULES. THE
            235.0 MW (ESC)        CLEANED GAS WILL PASS THROUGH CHEVRON MIST ELIMINATORS BEFORE EXITING A
COAL                              450 FOOT FRP LINED FLUE (A SECOND CARBON STEEL LINED FLUE, USED FOR EMER-
 2.80 %S                          GENCY BYPASS, IS ALSO IN THE STACK). THE WATER LOOP WILL BE OPEN, AND THE
LIMESTONE                         SLUDGE WILL BE PONDED. START UP IS SLATED FOR MARCH 1981.
BABCOCK & WILCOX
ENERGY CONSUMPTION:  1.6%
STATUS 2     STARTUP  3/81
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SOUTH CAROLINA PUBLIC SERVICE     SOUTH CAROLINA PUBLIC SERVICE HAS PLANS TO CONSTRUCT TWO NEW UNITS,
CROSS                             CROSS 1 AND 2, TO BE LOCATED IN CROSS, SOUTH CAROLINA.  EACH 500 MW
1                                 BOILER WILL FIRE COAL WITH A SULFUR CONTENT RANGING BETWEEN 1.0 AND 2.3%.
NEW         500.0 MW (GROSS)      THE UTILITY HAS SIGNED A CONTRACT WITH PEABODY PROCESS SYSTEMS FOR THE
            500.0 MW (ESC)        INSTALLATION OF A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL SO2
COAL                              EMISSIONS.  UNIT 1 IS SCHEDULED TO COMMENCE OPERATIONS IN MARCH 1985.
 1.60 %S  BITUMINOUS
LIMESTONE
PEABODY PROCESS SYSTEMS
ENERGY CONSUMPTION: ****%
STATUS 3     STARTUP  3/85
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SOUTH CAROLINA PUBLIC SERVICE     SOUTH CAROLINA PUBLIC SERVICE HAS PLANS TO CONSTRUCT TWO NEW UNITS,
CROSS                             CROSS 1 AND 2, TO BE LOCATED IN CROSS, SOUTH CAROLINA.  EACH 500 MW
2                                 BOILER WILL FIRE COAL WITH A SULFUR CONTENT RANGING BETWEEN 1.0 AND 2.3%.
NEW         500.0 MW (GROSS)      THE UTILITY HAS SIGNED A CONTRACT WITH PEABODY PROCESS SYSTEMS FOR THE
            500.0 MW (ESC)        INSTALLATION OF A WET LIMESTONE SCRUBBING SYSTEM TO CONTROL SO2
COAL                              EMISSIONS.  UNIT 2 IS SCHEDULED TO COMMENCE OPERATIONS IN NOVEMBER 1983.
 1.80 %S  BITUMINOUS
LIMESTONE
PEABODY PROCESS SYSTEMS
ENERGY CONSUMPTION: ****%
STATUS 3     STARTUP 11/83
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SOUTH CAROLINA PUBLIC SERVICE     WINYAH 2 OF SOUTH CAROLINA PUBLIC SERVICE IS A PULVERIZED BITUMINOUS COAL
WINYAH                            (1.70% S, 11,500 BTU/LB) FIRED UNIT LOCATED IN GEORGETOWN, SOUTH CAROLINA.
2                                 A COLD SIDE ESP AND A BABCOCK AND WILCOX VENTURI SCRUBBER/LIMESTONE TRAY
NEW         280.0 MW (GROSS)      TOWER ABSORBER TRAIN DESIGNED TO REMOVE 45% OF THE SO2 FROM THE BOILER
            140.0 MW (ESC)        FLUE GAS MAKE UP THE EMISSION CONTROL SYSTEM ON THIS UNIT. THE SYSTEM
COAL                              OPERATES IN AN OPEN WATER LOOP, AND THE SLUDGE IS DISPOSED IN AN ON-SITE
 1.70 %S  BITUMINOUS              UNLINED POND. THIS SYSTEM HAS BEEN OPERATIONAL SINCE JULY 1977.
LIMESTONE
BABCOCK & WILCOX
ENERGY CONSUMPTION:  1.1%
STATUS 1     STARTUP  7/77
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SOUTH CAROLINA PUBLIC SERVICE     WINYAH 3 OF SOUTH CAROLINA PUBLIC SERVICE IS A DRY BOTTOM BOILER WHICH
WINYAH                            FIRES 1.7% SULFUR COAL (11,500 BTU/LB) AND IS LOCATED IN GEORGETOWN,
3                                 SOUTH CAROLINA. AN ESP PRECEDES A BABCOCK AND WILCOX LIMESTONE FGD
NEW         280.0 MW (GROSS)      SYSTEM AND AN INDIRECT STEAM REHEATER. THE SYSTEM OPERATES IN A CLOSED
            280.0 MW (ESC)        WATER LOOP MODE. OPERATIONS COMMENCED IN MAY 1980.
COAL
 1.70 %S
LIMESTONE
BABCOCK & WILCOX
ENERGY CONSUMPTION:  2.1%
STATUS 1     STARTUP  5/80
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UNIT IDENTIFICATION	ABSTRACT
SOUTH CAROLINA PUBLIC SERVICE WINYAH 4 NEW 280.0 MW (GROSS) 280.0 MW (ESC) COAL 1.70 %S BITUMINOUS LIMESTONE AMERICAN AIR FILTER ENERGY CONSUMPTION: 2.1% STATUS 2 STARTUP 7/81	SOUTH CAROLINA PUBLIC SERVICE'S WINYAH 4 IS A BITUMINOUS COAL (1.70% S, 11,500 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN GEORGETOWN, SOUTH CAROLINA. TWO AMERICAN AIR FILTER LIMESTONE SLURRY SPRAY TOWERS WILL FOLLOW AN ESP. THE TEMPERATURE OF THE CLEANED GAS WILL BE RAISED BY AN INDIRECT STEAM REHEATER. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP MODE. START UP IS EXPECTED IN JULY 1981.
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW, SR. 1 NEW 200.0 MW (GROSS) 124.0 MW (ESC) COAL 1.30 %S BITUMINOUS LIMESTONE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: 5.5% STATUS 1 STARTUP 8/78	R.D. MORROW 1 OF SOUTHERN MISSISSIPPI ELECTRIC IS A PULVERIZED COAL (1.3% S, 12,000 BTU/LB) FIRED UNIT IN HATTISBURG, MISSISSIPPI. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A HOT SIDE ESP FOLLOWED BY A LIMESTONE VENTRI-ROD ABSORBER SUPPLIED BY RILEY STOKER/ENVIRONEERING. AFTER THE CLEANED GAS PASSES THROUGH A VERTICAL CHEVRON MIST ELIMINATOR, IT IS JOINED BY A 38% BYPASS REHEAT BEFORE IT IS DISCHARGED THROUGH A 408 FOOT STACK SHARED BY UNITS 1 AND 2 (EACH UNIT HAS ITS OWN ACID BRICK LINED FLUE). THE WATER LOOP IS CLOSED, AND THE FLYASH STABILIZED SLUDGE IS HAULED BY TRUCK TO AN OFF SITE LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE AUGUST 1978.
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW, SR. 2 NEW 200.0 MW (GROSS) 124.0 MW (ESC) COAL 1.30 %S BITUMINOUS LIMESTONE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: 5.5% STATUS 1 STARTUP 6/79	R.D. MORROW 2 OF SOUTHERN MISSISSIPPI ELECTRIC IS A PULVERIZED COAL (1.3% S, 12,000 BTU/LB) FIRED UNIT IN HATTISBURG, MISSISSIPPI. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A HOT SIDE ESP FOLLOWED BY A LIMESTONE VENTRI-ROD ABSORBER SUPPLIED BY RILEY STOKER/ENVIRONEERING. AFTER THE CLEANED GAS PASSES THROUGH A VERTICAL CHEVRON MIST ELIMINATOR, IT IS JOINED BY A 38% BYPASS REHEAT BEFORE IT IS DISCHARGED THROUGH A 408 FOOT STACK SHARED BY UNITS 1 AND 2 (EACH UNIT HAS ITS OWN ACID BRICK LINED FLUE). THE WATER LOOP IS CLOSED, AND THE FLYASH STABILIZED SLUDGE IS HAULED BY TRUCK TO AN OFF SITE LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE JUNE 1979.
SOUTHERN ILLINOIS POWER COOP MARION 4 NEW 173.0 MW (GROSS) 173.0 MW (ESC) COAL/REFUS 3.75 %S BITUMINOUS LIMESTONE BABCOCK & WILCOX ENERGY CONSUMPTION: 2.3% STATUS 1 STARTUP 5/79	UNIT 4 AT SOUTHERN ILLINOIS POWER COOP'S MARION STATION IN MARION, ILLINOIS IS A CYCLONE FIRED COAL (3.5% S, 9000 BTU/LB) BOILER WHICH IS SERVED BY A 89.4% EFFICIENT (DESIGN) LIMESTONE FGD SYSTEM SUPPLIED BY BABCOCK AND WILCOX. TWO SPRAY TOWERS AND A BRICK LINED STACK ARE DOWNSTREAM OF AN ESP IN THIS SYSTEM. THE WATER LOOP IS OPEN, AND THE FLYASH STABILIZED SLUDGE IS DEWATERED AND LANDFILLED. THE SYSTEM BECAME OPERATIONAL DURING MAY 1979.
SOUTHERN ILLINOIS POWER COOP MARION 5 NEW 300.0 MW (GROSS) 300.0 MW (ESC) COAL 3.00 %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/88	MARION 5 IS A COAL (3.0% S, 9000 BTU/LB) FIRED UNIT PLANNED BY SOUTHERN ILLNOIS POWER COOP FOR LOCATION IN MARION, ILLINOIS. THE UTILITY HAS NOT YET DECIDED ON AN FGD PROCESS AS IT IS WAITING FOR THE FINALIZATION OF THE SO2 REGULATIONS THE UNIT WILL HAVE TO MEET. START UP IS EXPECTED IN 1988.
SOUTHERN INDIANA GAS & ELEC A.B. BROWN 1 NEW 265.0 MW (GROSS) 265.0 MW (ESC) COAL 3.35 %S BITUMINOUS DUAL ALKALI FMC ENERGY CONSUMPTION: .8% STATUS 1 STARTUP 3/79	SOUTHERN INDIANA GAS AND ELECTRIC'S A.B.BROWN 1 IS A DRY BOTTOM PULVERIZED COAL (3.35% S, 13,010 BTU/LB) FIRED UNIT IN WEST FRANKLIN, INDIANA. FMC SUPPLIED A DUAL ALKALI FGD SYSTEM DESIGNED TO REMOVE 85% OF THE FLUE GAS SO2. THE UNIT CONSISTS OF TWO THREE STAGE DISC CONTACTORS. A COLD SIDE ESP PROVIDES PRIMARY PARTICULATE CONTROL, AND ONE CHEVRON MIST ELIMINATOR/MODULE PRECEDES A 498 FOOT ACID BRICK LINED STACK. THE SYSTEM PRODUCES A FILTER CAKE WASTE PRODUCT WHICH IS DISPOSED IN AN ON SITE LANDFILL. THE WATER LOOP CAN BE EITHER OPEN OR CLOSED. THE SYSTEM HAS BEEN OPERATIONAL SINCE MARCH 1979.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
SOUTHWESTERN ELECTRIC POWER DOLET HILLS 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .70 %S LIGNITE LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/86	DOLET HILLS 1 OF SOUTHWESTERN ELECTRIC POWER IS A PLANNED 720 MW LIGNITE (0.7%S, 7100BTU/LB) FIRED BOILER TO BE LOCATED IN MANSFIELD, LOUISIANA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF AN ESP FOR PARTICULATE CONTROL AND A WET LIMESTONE FGD SYSTEM FOR SO2 CONTROL. THE FLUE GAS WILL EXIT THROUGH A 525 FOOT STACK. A CONTRACT HAS BEEN AWARDED TO UOP FOR THE FGD SYSTEM. THE UNIT IS SCHEDULED TO STARTUP IN 1986.
SOUTHWESTERN ELECTRIC POWER DOLET HILLS 2 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .70 %S LIGNITE LIMESTONE VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/88	DOLET HILLS 2 OF SOUTHWESTERN ELECTRIC POWER IS A PLANNED 720 MW LIGNITE (0.7%S, 7100BTU/LB) FIRED BOILER TO BE LOCATED IN MANSFIELD, LOUISIANA. THE EMISSION CONTROL SYSTEM WILL CONSIST OF AN ESP FOR PARTICULATE CONTROL AND A WET LIMESTONE FGD SYSTEM FOR SO2 CONTROL. THE FLUE GAS WILL EXIT THROUGH A 525 FOOT STACK. THE UNIT IS SCHEDULED TO BEGIN OPERATIONS IN 1988.
SOUTHWESTERN ELECTRIC POWER HENRY W. PIRKEY 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL .80 %S LIGNITE LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 12/84	HENRY W. PIRKEY 1 IS A WET BOTTOM LIGNITE (0.8% S, 6300 BTU/LB) FIRED UNIT PLANNED BY SOUTHWESTERN ELECTRIC POWER FOR LOCATION IN HALLSVILLE, TEXAS. A CONTRACT HAS BEEN AWARDED TO THE AIR CORRECTION DIVISION OF UOP FOR FOUR LIMESTONE SPRAY TOWERS (99+% EFFICIENCY). MIST ELIMINATION WILL BE PROVIDED BY TWO STAGE CHEVRONS, AND THE STACK WILL BE ACID BRICK LINED. NO REHEAT IS PLANNED. THE WATER LOOP WILL BE CLOSED, AND THE SLUDGE WILL BE POZ-O-TEC STABILIZED. START UP IS EXPECTED BY DECEMBER 1984.
SPRINGFIELD CITY UTILITIES SOUTHWEST 1 NEW 194.0 MW (GROSS) 194.0 MW (ESC) COAL 3.50 %S BITUMINOUS LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 4.6% STATUS 1 STARTUP 4/77	SPRINGFIELD CITY UTILITIES' SOUTHWEST 1 IS A PULVERIZED BITUMINOUS COAL (3.5% S, 12,500 BTU/LB) FIRED BOILER LOCATED IN SPRINGFIELD, MISSOURI. THE EMISSION CONTROL SYSTEM FOR THIS UNIT CONSISTS OF A COLD SIDE ESP FOLLOWED BY TWO UOP LIMESTONE TCA MODULES WHICH WERE DESIGNED TO REMOVE 80% OF THE FLUE GAS SO2. ONE CHEVRON/MODULE LEADS TO A 384 FOOT CEILCOTE LINED STACK. THE DRY FLYASH STABILIZED SLUDGE IS DEWATERED BY A ROTARY DRUM VACUUM AND TRUCKED TO A LANDFILL. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL 1977.
SPRINGFIELD WATER, LIGHT & PWR DALLMAN 3 NEW 205.0 MW (GROSS) 205.0 MW (ESC) COAL 3.30 %S LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 5.9% STATUS 2 STARTUP 10/80	DALLMAN 3 OF SPRINGFIELD WATER, LIGHT, AND POWER IS A PULVERIZED COAL (3.3% S, 10,500 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN SPRINGFIELD, ILLINOIS. RESEARCH COTTRELL IS SUPPLYING A LIMESTONE FGD SYSTEM DESIGNED TO REMOVE 95% OF THE SO2 FROM 850,000 ACFM OF BOILER FLUE GAS. A HOT SIDE ESP WILL PRECEDE TWO PACKED TOWER ABSORBERS, ONE HORIZONTAL CHEVRON PER MODULE, AND A 500 FOOT ACID BRICK LINED STACK. NO REHEAT WILL BE PROVIDED. A SLUDGE DISPOSAL STRATEGY HAS NOT BEEN FINALIZED, BUT THE UTILITY IS CONSIDERING EITHER PONDING OR LANDFILL. FGD OPERATIONS SHOULD BEGIN IN OCTOBER 1980.
ST. JOE ZINC G.F. WEATON 1 RETROFIT 60.0 MW (GROSS) 60.0 MW (ESC) COAL 2.00 %S BITUMINOUS CITRATE MORRISON & KNUDSEN/U.S.B.M. ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 11/79	G.F. WEATON 1, OWNED BY ST. JOE ZINC, IS A COAL (2.0% S, 12,500 BTU/LB) FIRED BOILER LOCATED IN MONACA, PENNSYLVANIA. THE BUREAU OF MINES RETROFITTED A PROTOTYPE CITRATE FGD SYSTEM ON THIS UNIT, WHICH PROVIDES POWER FOR THE LOCAL UTILITY GRID. ONE VENTURI SCRUBBER/ABSORBER TRAIN FOLLOWS A COLD SIDE ESP. TWO CHEVRON MIST ELIMINATORS ARE FOLLOWED BY A COMBINATION OF INDIRECT HOT AIR AND DIRECT COMBUSTION REHEATERS, AND A 102 FOOT FIBERGLASS LINED SCRUBBER STACK. THE SYSTEM SO2 REMOVAL EFFICIENCY WILL BE OVER 90%. THE WATER LOOP IS CLOSED LOOP MODE. THE FGD SYSTEM COMMENCED OPERATION IN NOVEMBER 1979.

UNIT IDENTIFICATION	ABSTRACT
SUNFLOWER ELECTRIC COOP HOLCOMB 1 NEW 347.0 MW (GROSS) 347.0 MW (ESC) COAL .47 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: .9% STATUS 3 STARTUP 9/83	SUNFLOWER ELECTRIC COOP'S HOLCOMB 1 STATION IS A PLANNED 347 MW UNIT TO BE LOCATED IN HOLCOMB, KANSAS. THE PULVERIZED COAL (0.47% S, 8800 BTU/LB) FIRED BABCOCK AND WILCOX BOILER WILL UTILIZE A JOY MANUFACTURING/NIRO ATOMIZER DRY SCRUBBING PROCESS FOR SO2 CONTROL. A FABRIC FILTER WILL BE UTILIZED FOR PRIMARY PARTICLE CONTROL. THE UNIT IS SCHEDULED TO COMMENCE OPERATIONS IN THE FALL OF 1983.
TAMPA ELECTRIC BIG BEND 4 NEW 475.0 MW (GROSS) 475.0 MW (ESC) COAL 2.35 %S LIME/LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 2.1% STATUS 3 STARTUP 12/84	UNIT 4 AT TAMPA ELECTRIC'S BIG BEND STATION IS A PLANNED DRY BOTTOM PULVERIZED COAL (2.35% S, 10,300 BTU/LB) FIRED UNIT TO BE LOCATED IN TAMPA, FLORIDA. A CONTRACT HAS BEEN AWARDED TO RESEARCH-COTTRELL FOR A WET LIME/LIMESTONE SCRUBBING PROCESS. AN ESP WILL PROVIDE PRIMARY PARTICULATE CONTROL. THE FGD SYSTEM, WHICH WILL REMOVE 90% OF THE FLUE GAS SO2, WILL INCLUDE AN INDIRECT HOT AIR REHEATER LEADING TO A 490 FOOT CONCRETE LINED STACK. THE UNIT WILL PRODUCE GYPSUM AS A SALEABLE PRODUCT.
TENNESSEE VALLEY AUTHORITY JOHNSONVILLE 1-10 RETROFIT 1450.0 MW (GROSS) 600.0 MW (ESC) COAL 3.10 %S MAGNESIUM OXIDE ENVIRONEERING, RILEY STOKER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 12/81	UNITS 1 THROUGH 10 AT JOHNSONVILLE STATION OF TVA ARE COAL (3.1% S, 10,750 BTU/LB) FIRED BOILERS LOCATED IN NEW JOHNSONVILLE, TENNESSEE. UNITED ENGINEERS HAS BEEN AWARDED A CONTRACT TO PROVIDE ENGINEERING ASSISTANCE TO TVA FOR A 90% EFFICIENT MAGNESIUM OXIDE FGD SYSTEM TO BE RETROFITTED ON THESE UNITS. SULFURIC ACID WILL BE PRODUCED AS A BYPRODUCT FROM THIS SYSTEM, WHICH WILL FEATURE FOUR VENTURI SCRUBBER/ABSORBER TRAINS (ONE SPARE), 60% BYPASS REHEAT, AND A 600 FOOT STACK. START UP IS EXPECTED IN 1981.
TENNESSEE VALLEY AUTHORITY PARADISE 1 RETROFIT 704.0 MW (GROSS) 704.0 MW (ESC) COAL 4.20 %S LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 3/82	PARADISE 1 OF TVA IS A 4.2% SULFUR COAL FIRED UNIT LOCATED IN PARADISE, KENTUCKY. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR AN 84.2% EFFICIENT LIMESTONE FGD SYSTEM TO BE RETROFITTED ON THIS BOILER. SIX VENTURI SCRUBBERS AND VENTURI ABSORBER TRAINS WILL FOLLOW AN ESP. INLET FLUE GAS WILL BE USED TO HEAT WATER, WHICH IN TURN WILL BE USED TO REHEAT THE OUTLET FLUE GAS. FORCED OXIDATION WILL BE USED IN ONE MODULE TO CONTROL SCALING THROUGHOUT THE SYSTEM. THE UTILITY EXPECTS TO GET AN 80% SOLIDS LANDFILLABLE GRADE SLUDGE. OPERATIONS SHOULD START IN MARCH 1982.
TENNESSEE VALLEY AUTHORITY PARADISE 2 RETROFIT 704.0 MW (GROSS) 704.0 MW (ESC) COAL 4.20 %S LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/82	PARADISE 2 OF TVA IS A 4.2% SULFUR COAL FIRED UNIT LOCATED IN PARADISE, KENTUCKY. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR AN 84.2% EFFICIENT LIMESTONE FGD SYSTEM TO BE RETROFITTED ON THIS BOILER. SIX VENTURI SCRUBBERS AND VENTURI ABSORBER TRAINS WILL FOLLOW AN ESP. INLET FLUE GAS WILL BE USED TO HEAT WATER, WHICH IN TURN WILL BE USED TO REHEAT THE OUTLET FLUE GAS. FORCED OXIDATION WILL BE USED IN ONE MODULE TO CONTROL SCALING THROUGHOUT THE SYSTEM. THE UTILITY EXPECTS TO GET AN 80% SOLIDS LANDFILLABLE GRADE SLUDGE. OPERATIONS SHOULD START IN JUNE 1982.
TENNESSEE VALLEY AUTHORITY SHAWNEE 10A RETROFIT 10.0 MW (GROSS) 10.0 MW (ESC) COAL 2.90 %S BITUMINOUS LIME/LIMESTONE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/72	SHAWNEE 10 OF TVA IS A 2.9% SULFUR BITUMINOUS COAL FIRED BOILER LOCATED IN PADUCAH, KENTUCKY. MODULE 10A IS A RETROFIT PROTOTYPE LIME/LIMESTONE TCA SYSTEM SUPPLIED BY THE AIR CORRECTION DIVISION, UOP. THE SYSTEM UTILIZES A CHEVRON MIST ELIMINATOR AND A DIRECT COMBUSTION REHEATER, AND OPERATES IN A CLOSED WATER LOOP. THIS TEST PROGRAM IS FUNDED BY THE EPA WITH TVA AS THE CONSTRUCTOR AND FACILITY OPERATOR. THE BECHTEL CORP. OF SAN FRANCISCO IS THE MAJOR CONTRACTOR, TEST DIRECTOR, AND REPORT WRITER. THE SYSTEM HAS BEEN OPERATIONAL SINCE APRIL 1972.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
TENNESSEE VALLEY AUTHORITY SHAWNEE 10B RETROFIT 10.0 MW (GROSS) 10.0 MW (ESC) COAL 2.90 %S BITUMINOUS LIME/LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 4/72	SHAWNEE 10 OF TVA IS A 2.9% SULFUR BITUMINOUS COAL FIRED BOILER LOCATED IN PADUCAH, KENTUCKY. MODULE 10B IS A RETROFIT PROTOTYPE LIME/LIMESTONE VENTURI SCRUBBER/SPRAY TOWER ABSORBER SUPPLIED BY CHEMICO. THE SYSTEM, OPERATIONAL SINCE APRIL 1972, INCLUDES A CHEVRON MIST ELIMINATOR AND A DIRECT COMBUSTION REHEATER, AND OPERATES IN A CLOSED WATER LOOP. THIS TEST PROGRAM IS FUNDED BY THE EPA WITH TVA AS THE CONSTRUCTOR AND FACILITY OPERATOR. THE BECHTEL CORP. OF SAN FRANCISCO IS THE MAJOR CONTRACTOR, TEST DIRECTOR, AND REPORT WRITER.
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK 7 RETROFIT 575.0 MW (GROSS) 575.0 MW (ESC) COAL 3.70 %S BITUMINOUS LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 9/81	WIDOWS CREEK 7 IS A PULVERIZED BITUMINOUS COAL (3.7% S, 11,100 BTU/LB) FIRED BOILER OF TVA LOCATED IN BRIDGEPORT, ALABAMA. COMBUSTION ENGINEERING IS PRESENTLY RETROFITTING A LIMESTONE VENTRI ROD SCRUBBER/SPRAY TOWER ABSORBER FGD SYSTEM ON THIS UNIT. AN ESP WILL PRECEDE THE SCRUBBING TRAIN, AND A COMBINATION OF A BULK ENTRAINMENT SEPARATOR, TWO CHEVRON MIST ELIMINATORS AND A FINNED TUBE REHEATER FOLLOW THE SYSTEM. THE SCRUBBER SLUDGE WILL BE DISPOSED IN A SLUDGE POND. CONSTRUCTION BEGAN IN SEPTEMBER 1978, AND START UP IS EXPECTED IN SEPTEMBER 1981.
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK 8 RETROFIT 550.0 MW (GROSS) 550.0 MW (ESC) COAL 3.70 %S LIMESTONE TENNESSEE VALLEY AUTHORITY ENERGY CONSUMPTION: 4.7% STATUS 1 STARTUP 5/77	WIDOWS CREEK 8 OF TVA IS A BALANCED DRAFT, TANGENTIALLY FIRED COAL (3.7% S, 10,000 BTU/LB) BOILER IN BRIDGEPORT, ALABAMA. TVA RETROFITTED THIS UNIT WITH A LIMESTONE FGD SYSTEM (80% DESIGN SO2 REMOVAL EFFICIENCY) WHICH BEGAN OPERATIONS IN MAY 1977. AN ESP PRECEDES FOUR VARIABLE THROAT VENTURI SCRUBBER/MULTIGRID TOWER ABSORBER TRAINS (ONE OF THE TOWERS IS PACKED). ONE VERTICAL CHEVRON/TRAIN AND AN INDIRECT HOT AIR REHEATER ARE INCLUDED IN THE SYSTEM. SLUDGE FROM THE FGD SYSTEM IS PONDED.
TEXAS MUNICIPAL POWER AGENCY GIBBONS CREEK 1 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL 1.06 %S LIGNITE LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 1/82	GIBBONS CREEK 1 OF THE TEXAS MUNICIPAL POWER AGENCY IS A DRY BOTTOM PULVERIZED LIGNITE (1.06% S, 4860 BTU/LB) FIRED UNIT PLANNED FOR LOCATION IN CARLOS, TEXAS. THE EMISSION CONTROL SYSTEM WILL CONSIST OF A COLD SIDE ESP FOLLOWED BY THREE 50% CAPACITY LIMESTONE SPRAY TOWERS. A CONTRACT HAS BEEN AWARDED TO COMBUSTION ENGINEERING FOR THE FGD SYSTEM, WHICH INCLUDES A CHEVRON MIST ELIMINATOR AND A STEAM COIL REHEATER. CLEANED FLUE GAS WILL BE DISCHARGED THROUGH A 465 FOOT ACID BRICK LINED STACK. THE POZ-O-TEC STABILIZED SLUDGE WILL BE USED AS STRIP MINE LANDFILL. START UP IS EXPECTED IN JANUARY 1982.
TEXAS POWER & LIGHT SANDOW 4 NEW 545.0 MW (GROSS) 382.0 MW (ESC) COAL 1.60 %S LIGNITE LIMESTONE COMBUSTION ENGINEERING ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 11/80	SANDOW 4 IS A PULVERIZED 1.6% SULFUR LIGNITE FIRED BOILER OF TEXAS POWER AND LIGHT UNDER CONSTRUCTION IN ROCKDALE, TEXAS. COMBUSTION ENGINEERING IS SUPPLYING THREE LIMESTONE SPRAY TOWERS FOR THIS UNIT. A COLD SIDE ESP WILL PROVIDE PRIMARY PARTICULATE CONTROL. A 30% BYPASS REHEAT WILL BE USED, AND THE OVERALL SO2 REMOVAL EFFICIENCY WILL BE 75%. THE SYSTEM WILL OPERATE IN A CLOSED WATER LOOP, AND THE SLUDGE WILL BE PONDED. START UP IS EXPECTED IN NOVEMBER 1980.
TEXAS POWER & LIGHT TWIN OAKS 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .70 %S LIGNITE LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 8/84	TWIN OAKS 1 IS A 0.70% SULFUR LIGNITE FIRED BOILER PLANNED BY TEXAS POWER AND LIGHT AND ALCOA FOR LOCATION IN BREMOND, TEXAS. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIMESTONE FGD SYSTEM ON THIS UNIT. START UP IS EXPECTED IN AUGUST 1984.

UNIT IDENTIFICATION	ABSTRACT
TEXAS POWER & LIGHT TWIN OAKS 2 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .70 %S LIGNITE LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 8/85	TWIN OAKS 2 IS A 0.70% SULFUR LIGNITE FIRED BOILER PLANNED BY TEXAS POWER AND LIGHT AND ALCOA FOR LOCATION IN BREMOND, TEXAS. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIMESTONE FGD SYSTEM ON THIS UNIT. START UP IS EXPECTED IN AUGUST 1985.
TEXAS UTILITIES FOREST GROVE 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .80 %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 5 STARTUP 0/87	TEXAS UTILITIES IS PLANNING A LIGNITE (0.8% S, 7000 BTU/LB) FIRED BOILER, FOREST GROVE 1, WHICH WILL BE LOCATED IN ATHENS, TEXAS. THE UTILITY IS PRESENTLY REQUESTING BIDS ON AN FGD SYSTEM FOR THIS UNIT. TWO ESP'S WILL PROVIDE PRIMARY PARTICULATE CONTROL, AND NO STACK GAS REHEAT IS PLANNED. START UP IS EXPECTED IN LATE 1987.
TEXAS UTILITIES MARTIN LAKE 1 NEW 793.0 MW (GROSS) 595.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 4/77	TEXAS UTILITIES' MARTIN LAKE 1 IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER IN TATUM, TEXAS. THIS UNIT IS EQUIPPED WITH AN EMISSION CONTROL SYSTEM WHICH INCLUDES A COLD SIDE ESP AND A LIMESTONE FGD SYSTEM, BOTH SUPPLIED BY RESEARCH COTTRELL. THE FGD SYSTEM CONSISTS OF SIX PACKED SPRAY TOWER ABSORBERS WHICH TREAT 75% OF THE TOTAL BOILER FLUE GAS. THE REMAINING FLUE GAS IS BYPASSED FOR REHEAT. THE TOTAL DESIGN SO2 REMOVAL EFFICIENCY IS 70.5%. TWO CHEVRONS/MODULE PROVIDE MIST ELIMINATION. THE FLUE GAS CLEANING WASTES ARE FLYASH STABILIZED AND DISPOSED IN AN ON-SITE LANDFILL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP. INITIAL SYSTEM OPERATIONS TOOK PLACE IN APRIL 1977.
TEXAS UTILITIES MARTIN LAKE 2 NEW 793.0 MW (GROSS) 595.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 5/78	TEXAS UTILITIES' MARTIN LAKE 2 IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER IN TATUM, TEXAS. THIS UNIT IS EQUIPPED WITH AN EMISSION CONTROL SYSTEM WHICH INCLUDES A COLD SIDE ESP AND A LIMESTONE FGD SYSTEM, BOTH SUPPLIED BY RESEARCH COTTRELL. THE FGD SYSTEM CONSISTS OF SIX PACKED SPRAY TOWER ABSORBERS WHICH TREAT 75% OF THE TOTAL BOILER FLUE GAS. THE REMAINING FLUE GAS IS BYPASSED FOR REHEAT. THE TOTAL DESIGN SO2 REMOVAL EFFICIENCY IS 70.5%. TWO CHEVRONS/MODULE PROVIDE MIST ELIMINATION. THE FLUE GAS CLEANING WASTES ARE FLYASH STABILIZED AND DISPOSED IN AN ON-SITE LANDFILL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP. INITIAL SYSTEM OPERATIONS TOOK PLACE IN MAY 1978.
TEXAS UTILITIES MARTIN LAKE 3 NEW 793.0 MW (GROSS) 595.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: 1.3% STATUS 1 STARTUP 2/79	TEXAS UTILITIES' MARTIN LAKE 3 IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER IN TATUM, TEXAS. THIS UNIT IS EQUIPPED WITH AN EMISSION CONTROL SYSTEM WHICH INCLUDES A COLD SIDE ESP AND A LIMESTONE FGD SYSTEM, BOTH SUPPLIED BY RESEARCH COTTRELL. THE FGD SYSTEM CONSISTS OF SIX PACKED SPRAY TOWER ABSORBERS WHICH TREAT 75% OF THE TOTAL BOILER FLUE GAS. THE REMAINING FLUE GAS IS BYPASSED FOR REHEAT. THE TOTAL DESIGN SO2 REMOVAL EFFICIENCY IS 70.5%. TWO CHEVRONS/MODULE PROVIDE MIST ELIMINATION. THE FLUE GAS CLEANING WASTES ARE FLYASH STABILIZED AND DISPOSED IN AN ON-SITE LANDFILL. THE SYSTEM OPERATES IN A CLOSED WATER LOOP. INITIAL SYSTEM OPERATIONS TOOK PLACE IN FEBRUARY 1979.
TEXAS UTILITIES MARTIN LAKE 4 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL .90 %S LIGNITE LIMESTONE RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 0/85	MARTIN LAKE 4 OF TEXAS UTILITIES IS A LIGNITE (0.9% S, 7380 BTU/LB) FIRED BOILER UNDER CONSTRUCTION IN TATUM, TEXAS. A CONTRACT FOR A LIMESTONE FGD SYSTEM FOR THIS UNIT HAS BEEN AWARDED TO RESEARCH COTTRELL. CONSTRUCTION HAS NOT YET BEGUN ON THE FGD SYSTEM. FGD START UP IS EXPECTED IN 1985 OR 1986.

UNIT IDENTIFICATION	ABSTRACT
TEXAS UTILITIES MILL CREEK 1 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL ***** %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/85	MILL CREEK 1 OF TEXAS UTILITIES IS A PLANNED LIGNITE FIRED UNIT TO BE LOCATED IN HENDERSON, TEXAS. THE UTILITY WILL INCLUDE AN FGD SYSTEM ON THIS UNIT, BUT NO DECISIONS HAVE BEEN MADE AS TO THE PROCESS TYPE OR VENDOR. ESP´S WILL PROVIDE PRIMARY PARTICLE CONTROL. START UP IS EXPECTED IN 1985.
TEXAS UTILITIES MILL CREEK 2 NEW 750.0 MW (GROSS) 750.0 MW (ESC) COAL ***** %S LIGNITE PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 0/86	MILL CREEK 2 OF TEXAS UTILITIES IS A PLANNED LIGNITE FIRED UNIT TO BE LOCATED IN HENDERSON, TEXAS. THE UTILITY WILL INCLUDE AN FGD SYSTEM ON THIS UNIT, BUT NO DECISIONS HAVE BEEN MADE AS TO THE PROCESS TYPE OR VENDOR. ESP´S WILL PROVIDE PRIMARY PARTICLE CONTROL. START UP IS EXPECTED IN 1986.
TEXAS UTILITIES MONTICELLO 3 NEW 800.0 MW (GROSS) 800.0 MW (ESC) COAL 1.50 %S LIGNITE LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/78	MONTICELLO 3 OF TEXAS UTILITIES IS A LIGNITE (1.5% S, 7000 BTU/LB) FIRED UNIT IN MT. PLEASANT, TEXAS. THIS UNIT´S EMISSION CONTROL SYSTEM CONSISTS OF TWO COLD SIDE ESP´S FOLLOWED BY THREE CHEMICO LIMESTONE SPRAY TOWERS (74% DESIGN SO2 REMOVAL EFFICIENCY), ONE HORIZONTAL CHEVRON MIST ELIMINATOR/MODULE, AND AN INDIRECT HOT AIR REHEATER. THE WATER LOOP IS CLOSED, AND THE FLYASH STABILIZED SLUDGE IS DISPOSED IN AN ON SITE LANDFILL. THIS SYSTEM HAS BEEN OPERATIONAL SINCE MAY 1978.
TUCSON ELECTRIC POWER SPRINGERVILLE 1 NEW 370.0 MW (GROSS) 370.0 MW (ESC) COAL .61 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 1/85	TUCSON ELECTRIC POWER WILL BE BUILDING TWO NEW UNITS IN SPRINGERVILLE, ARIZONA, SPRINGERVILLE 1 AND 2. THE UNITS WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.53-0.69% S AND 8500-8900 BTU/LB). A CONTRACT HAS BEEN AWARDED TO JOY MANUFACTURING/NIRO ATOMIZER FOR A LIME/SPRAY DRYING FGD SYSTEM TO CONTROL PARTICULATE MATTER AND SO2 EMISSIONS. THE SYSTEM WILL BE DESIGNED TO ACCOMODATE A REHEATER (SHOULD ONE BE REQUIRED) AND WILL OPERATE IN A CLOSED WATER LOOP. CLEANED FLUE GAS WILL EXIT THE SYSTEM VIA A 500 FOOT CONCRETE STACK. STARTUP IS SCHEDULED FOR JANUARY 1985.
TUCSON ELECTRIC POWER SPRINGERVILLE 2 NEW 370.0 MW (GROSS) 370.0 MW (ESC) COAL .61 %S SUBBITUMINOUS LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 3/87	TUCSON GAS AND ELECTRIC WILL BE BUILDING TWO NEW UNITS IN SPRINGERVILLE, ARIZONA, SPRINGERVILLE 1 AND 2. THE UNITS WILL FIRE PULVERIZED SUBBITUMINOUS COAL (0.53-0.69% S AND 8500-8900 BTU/LB). A CONTRACT HAS BEEN AWARDED TO JOY MANUFACTURING/NIRO ATOMIZER FOR A LIME/SPRAY DRYING FGD SYSTEM TO CONTROL PARTICULATE MATTER AND SO2 EMISSIONS. THE SYSTEM WILL BE DESIGNED TO ACCOMODATE A REHEATER (SHOULD ONE BE REQUIRED) AND WILL OPERATE IN A CLOSED WATER LOOP. CLEANED FLUE GAS WILL EXIT THE SYSTEM VIA A 500 FOOT CONCRETE STACK. STARTUP IS SCHEDULED FOR MARCH 1987.
UNITED POWER ASSOCIATION STANTON 1A NEW 50.0 MW (GROSS) 50.0 MW (ESC) COAL .77 %S LIGNITE LIME/SPRAY DRYING RESEARCH-COTTRELL ENERGY CONSUMPTION: ****% STATUS 2 STARTUP 6/82	STANTON 1A OF THE UNITED POWER ASSOCIATION IS A PULVERIZED COAL (0.77% S, 7000 BTU/LB) FIRED UNIT UNDER CONSTRUCTION IN STANTON, NORTH DAKOTA. A CONTRACT HAS BEEN AWARDED TO KOMLINE AND SANDERSON FOR A LIME SPRAY DRYER. A FABRIC FILTER SUPPLIED BY RESEARCH COTTRELL WILL BE DESIGNED TO REMOVE 99% OF THE PARTICULATE. THE SYSTEM WILL OPERATE IN AN OPEN LOOP MODE WITH SLUDGE DISPOSAL TO BE IN A CLAY LINED SETTLING POND. OPERATIONS ARE SCHEDULED TO COMMENCE IN JUNE 1982.

UNIT IDENTIFICATION	ABSTRACT
UTAH POWER & LIGHT HUNTER 1 NEW 400.0 MW (GROSS) 360.0 MW (ESC) COAL .55 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 5/79	HUNTER 1 OF UTAH POWER AND LIGHT IS A COAL (0.55% S, 12,500 BTU/LB) FIRED UNIT IN CASTLEDALE, UTAH. CHEMICO SUPPLIED A PEBBLE LIME WET SCRUBBING SYSTEM WHICH BECAME OPERATIONAL IN MAY 1979. THE SCRUBBING SYSTEM IS DESIGNED TO OPERATE IN AN OPEN WATER LOOP WITH AN SO2 REMOVAL EFFICIENCY OF 80%. PRIMARY PARTICULATE CONTROL IS PROVIDED BY AN UPSTREAM ESP, AND STACK GAS REHEAT IS PROVIDED BY BYPASS. THE SLUDGE IS FLYASH STABILIZED AND DISPOSED ON-SITE.
UTAH POWER & LIGHT HUNTER 2 NEW 400.0 MW (GROSS) 360.0 MW (ESC) COAL .55 %S LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 1 STARTUP 6/80	UTAH POWER AND LIGHT'S HUNTER 2 IS A COAL (0.55% S, 12,500 BTU/LB) FIRED UNIT LOCATED IN CASTLEDALE, UTAH. FOR EMISSION CONTROL, CHEMICO SUPPLIED A PEBBLE LIME WET SCRUBBING SYSTEM DESIGNED TO OPERATE IN AN OPEN WATER LOOP WITH AN SO2 REMOVAL EFFICIENCY OF 80%. AN UPSTREAM ESP PROVIDES PRIMARY PARTICLE CONTROL, AND A BYPASS SYSTEM PROVIDES STACK GAS REHEAT. THE SLUDGE IS FLYASH STABILIZED AND DISPOSED OF ON-SITE. START UP OF BOTH THE BOILER AND FGD SYSTEM TOOK PLACE IN JUNE 1980.
UTAH POWER & LIGHT HUNTER 3 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/83	UTAH POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, HUNTER 3 AND 4, TO BE CONSTRUCTED IN CASTLEDALE, UTAH. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIME, NONREGENERABLE FGD UNIT FOR EMISSION CONTROL. THE PULVERIZED COAL FIRED UNIT (0.55% S, 12,500 BTU/LB) IS TO BEGIN OPERATIONS IN JUNE 1983.
UTAH POWER & LIGHT HUNTER 4 NEW 400.0 MW (GROSS) 400.0 MW (ESC) COAL .55 %S BITUMINOUS LIMESTONE CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: ****% STATUS 3 STARTUP 6/85	UTAH POWER AND LIGHT HAS PLANS FOR TWO NEW UNITS, HUNTER 3 AND 4, TO BE CONSTRUCTED IN CASTLEDALE, UTAH. A CONTRACT HAS BEEN AWARDED TO CHEMICO FOR A LIME, NONREGENERABLE FGD UNIT FOR EMISSION CONTROL. THE PULVERIZED COAL FIRED UNIT (0.55% S, 12,500 BTU/LB) IS TO BEGIN OPERATIONS IN JUNE 1985.
UTAH POWER & LIGHT HUNTINGTON 1 NEW 430.0 MW (GROSS) 366.0 MW (ESC) COAL .55 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 1.6% STATUS 1 STARTUP 5/78	HUNTINGTON 1 OF UTAH POWER IS A TANGENTIALLY FIRED PULVERIZED COAL (0.55% S, 12,500 BTU/LB) BOILER IN PRICE, UTAH. A COLD SIDE ESP TREATS 1,742,000 ACFM OF FLUE GAS AND IS FOLLOWED BY A CHEMICO LIME FGD SYSTEM CONSISTING OF FOUR SPRAY TOWERS (60% DESIGN EFFICIENCY). ONE FOUR PASS CHEVRON/MODULE PROVIDES MIST ELIMINATION, AND A COMBINATION OF A STEAM TUBE AND 10-20% BYPASS REHEATERS BOOST THE GAS TEMPERATURE 45-50 DEG F. THE SYSTEM OPERATES IN A CLOSED WATER LOOP, AND THE FLYASH STABILIZED SLUDGE IS TRUCKED TO AN ON-SITE LANDFILL. THE SYSTEM INCLUDES A 600 FOOT ACID BRICK LINED STACK, AND HAS BEEN OPERATIONAL SINCE MAY 1978.
UTAH POWER & LIGHT NAUGHTON 3 RETROFIT 330.0 MW (GROSS) 330.0 MW (ESC) COAL .55 %S SUBBITUMINOUS SODIUM CARBONATE AIR CORRECTION DIVISION, UOP ENERGY CONSUMPTION: 1.5% STATUS 2 STARTUP 6/81	NAUGHTON 3 OF UTAH POWER AND LIGHT IS A PULVERIZED COAL (.5% S, 9500 BTU/LB) FIRED BOILER LOCATED IN KEMMERER, WYOMING. THE BOILER SUPPLIES 1,500,000 ACFM OF FLUE GAS TO AN ESP FOR PARTICULATE CONTROL. THE UNIT IS CURRENTLY BEING RETROFITTED WITH A UOP WET SODA ASH FGD SYSTEM FOR SO2 CONTROL. THE FGD SYSTEM IS DESIGNED TO REMOVE 70% OF THE SO2 BEFORE THE FLUE GAS EXITS OUT A 475 FOOT STACK. INITIAL STARTUP IS SCHEDULED FOR JUNE 1981.

SECTION 2
STATUS OF FGD SYSTEMS

UNIT IDENTIFICATION	ABSTRACT
WEST PENN POWER MITCHELL 33 RETROFIT 300.0 MW (GROSS) 300.0 MW (ESC) COAL 2.80 %S BITUMINOUS LIME CHEMICO DIVISION, ENVIROTECH ENERGY CONSUMPTION: 1.1% STATUS 3 STARTUP 8/82	UNIT 33 AT ALLEGHENY POWER SYSTEM"S MITCHELL POWER STATION IN COURTNEY, PENNSYLVANIA IS A 2.8% SULFUR COAL FIRED BOILER. A CONTRACT WAS AWARDED TO CHEMICO FOR A LIME SCRUBBING PROCESS. SO2 REMOVAL EFFICIENCY WILL BE 95%. START UP IS PLANNED FOR AUGUST 1982.
WEST TEXAS UTILITIES OKLAUNION 1 NEW 720.0 MW (GROSS) 720.0 MW (ESC) COAL ***** %S PROCESS NOT SELECTED VENDOR NOT SELECTED ENERGY CONSUMPTION: ****% STATUS 6 STARTUP 12/86	WEST TEXAS UTILITIES HAS PLANS FOR A PULVERIZED COAL FIRED BOILER TO BE LOCATED NEAR OKLAUNION, TEXAS. THE UTILITY WILL INCLUDE AN FGD SYSTEM FOR EMISSION CONTROL FROM THE 720 MW UNIT. THE OKLAUNION 1 PLANT IS SCHEDULED TO COMMENCE OPERATIONS IN 1986.

COMPANY NAME	ALABAMA ELECTRIC COOP	
PLANT NAME	TOMBIGBEE	
UNIT NUMBER	2	
CITY	LEROY	
STATE	ALABAMA	
GROSS UNIT GENERATING CAPACITY - MW	255.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	235.0	
EQUIVALENT SCRUBBED CAPACITY - MW	179.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	14.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	1.15	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	3.1	
INITIAL START-UP DATE	9/78	
COMMERCIAL START-UP DATE	9/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	59.50	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.30	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	8.8	(140 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A		35.8		21.1						
	B		56.7		33.5						
	SYSTEM	90.7	46.3		27.3			744	439	203	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY UNIT 2 WAS UNAVAILABLE 69 HOURS DUE TO REPAIRS NEEDED ON AN ABRADED EXPANSION JOINT AND A RUPTURED WASTE SLURRY LINE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A		84.3		84.3						
	B		74.7		74.7						
	SYSTEM	99.3	79.5		79.5			696	696	554	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT 2 FGD SYSTEM OPERATED ALL BUT 5 HOURS DURING FEBRUARY, IN WHICH TIME THE BOILER WAS BEING BROUGHT ON-LINE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A		81.6		75.0						
	B		79.4		73.0						
	SYSTEM	100.0	80.5		74.0			744	684	551	

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD SYSTEM PROBLEMS WERE ENCOUNTERED DURING MARCH. THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A		61.3		61.3						

ALABAMA ELECTRIC COOP: TOMBIGBEE 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                 SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------
       B                      86.6                    86.5
       SYSTEM     100.0       74.0                    73.9                   720   719    532

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE UTILITY REPORTED THAT FOR THE MONTH OF APRIL THE SYSTEM WAS
                          AVAILABLE 100% OF THE TIME.

 5/80  A                      34.9                    34.7
       B                      92.8                    92.2
       SYSTEM     100.0       63.9                    63.5                   744   739    472

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE FGD SYSTEM WAS AVAILABLE 100% DURING MAY.

 6/80  A          100.0       88.0       100.0        11.0
       B             .0         .0          .0          .0
       SYSTEM      50.0       44.0        50.0         5.5                   720    90     40   7.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          MODULE B WAS OUT OF SERVICE THE ENTIRE MONTH OF JUNE DUE TO A DAMAGED
                          DAMPER DRIVE MOTOR.

                          MODULE A WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH, BUT WAS NEEDED
                          ONLY 79 HOURS.

 7/80  A          100.0       97.6       100.0        54.5
       B             .0         .0          .0          .0
       SYSTEM      50.0       48.8        50.0        27.3                   744   415    203  26.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE B-MODULE REMAINED OUT OF SERVICE THROUGH JULY DUE TO THE DAMAGED
                          DAMPER DRIVE MOTOR.

                          THE A-MODULE OPERATED ON AN AS NEEDED BASIS WITH NO PROBLEMS.

 8/80  A          100.0       84.0        84.0        18.3
       B             .0         .0          .0          .0
       SYSTEM      50.0       42.0        42.0         9.2                   744   162     68  14.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING AUGUST MODULE B REMAINED OUT OF SERVICE DUE TO DAMAGED DAMPER
                          OPERATOR MOTORS.

 9/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE INFORMATION FOR THE MONTH OF SEPTEMBER IS NOT YET AVAILABLE.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                  ALABAMA ELECTRIC COOP
PLANT NAME                                    TOMBIGBEE
UNIT NUMBER                                   3
CITY                                          LEROY
STATE                                         ALABAMA
GROSS UNIT GENERATING CAPACITY - MW             255.0
NET UNIT GENERATING CAPACITY W/FGD - MW         235.0
EQUIVALENT SCRUBBED CAPACITY - MW               179.0

** FUEL DATA
    FUEL TYPE                                 COAL
    FUEL GRADE                                BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                 26749.        ( 11500 BTU/LB)
    AVERAGE ASH CONTENT - %                      14.00
    AVERAGE MOISTURE CONTENT - %                  7.00
    AVERAGE SULFUR CONTENT - %                    1.15
    AVERAGE CHLORIDE CONTENT - %                   .04

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                      WET SCRUBBING
    PROCESS TYPE                              LIMESTONE
    SYSTEM SUPPLIER                           PEABODY PROCESS SYSTEMS
    NEW/RETROFIT                              NEW
    ENERGY CONSUMPTION - %                        3.1
    INITIAL START-UP DATE                      6/79
    COMMERCIAL START-UP DATE                   6/79
    SO2 DESIGN REMOVAL EFFICIENCY - %            59.50
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %    99.30
    ABSORBER SPARE CAPACITY INDEX - %              .0
    ABSORBER SPARE COMPONENTS INDEX                .0

** WATER LOOP
    TYPE                                      CLOSED
    FRESH MAKE-UP WATER - LITER/S                 8.8        (  140 GPM)

** DISPOSAL
    TYPE                                      LINED POND


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL    PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ----   ----------- ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

1/80   A                      69.2                    30.5
       B                      45.4                    20.0
       SYSTEM      100.0      57.3                    25.3                  744    328    188

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING JANUARY UNIT 3 WAS AVAILABLE THE ENTIRE MONTH.

2/80   A                      33.3                     1.2
       B                     100.0                     3.5
       SYSTEM      100.0      66.7                     2.4                  696     24     16

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING FEBRUARY THE UNIT 3 BOILER AND FGD SYSTEM OPERATED ONLY 24 HOURS.
                         THE FGD SYSTEM WAS AVAILABLE THE ENTIRE MONTH.

3/80   SYSTEM      100.0                                .0                  744      0      0     .0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MARCH THE UNIT 3 GENERATOR WAS KEPT OUT OF SERVICE.  THE FGD SYSTEM
                         WAS AVAILABLE THE ENTIRE MONTH.

4/80   SYSTEM                                           .0                  720      0      0     .0
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ALABAMA ELECTRIC COOP: TOMBIGBEE 3 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT DURING APRIL THE BOILER DID NOT OPERATE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A		8.3		.7						
	B		.0		.0						
	SYSTEM	95.8	4.2		.3			744	60	5	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE 713 HOURS DURING MAY; HOWEVER, THE BOILER ONLY OPERATED 60 HOURS DUE TO BOILER RELATED PROBLEMS.

THE B MODULE WAS OUT FOR 31 HOURS WHEN THE INLET DAMPER SWITCH FAILED CAUSING THE DRIVE MOTOR TO BURN OUT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	100.0	59.1	100.0	52.8						
	B	100.0	58.6	100.0	52.4						
	SYSTEM	100.0	58.9	100.0	52.6			720	643	379	52.0

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD SYSTEM-RELATED PROBLEMS WERE ENCOUNTERED DURING JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	100.0	45.5	100.0	39.7						
	B	100.0	90.0	100.0	78.6						
	SYSTEM	100.0	67.8	100.0	59.2			744	650	440	47.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH OF JULY. THE MODULES ARE UTILIZED ON AN AS NEEDED BASIS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	100.0	95.7	100.0	75.8						
	B	100.0	91.6	100.0	72.6						
	SYSTEM	100.0	93.7	100.0	74.2			744	590	552	63.4

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE INFORMATION FOR THE MONTH OF SEPTEMBER IS NOT YET AVAILABLE.

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COMPANY NAME                                    ARIZONA ELECTRIC POWER COOP
PLANT NAME                                      APACHE
UNIT NUMBER                                     2
CITY                                            COCHISE
STATE                                           ARIZONA
GROSS UNIT GENERATING CAPACITY - MW               195.0
NET UNIT GENERATING CAPACITY W/FGD - MW           175.0
EQUIVALENT SCRUBBED CAPACITY - MW                  98.0

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                   23260.        ( 10000 BTU/LB)
    AVERAGE ASH CONTENT - %                         15.00
    AVERAGE MOISTURE CONTENT - %                     9.00
    AVERAGE SULFUR CONTENT - %                        .55
    AVERAGE CHLORIDE CONTENT - %                ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIMESTONE
    SYSTEM SUPPLIER                             RESEARCH-COTTRELL
    NEW/RETROFIT                                NEW
    ENERGY CONSUMPTION - %                           4.1
    INITIAL START-UP DATE                        8/78
    COMMERCIAL START-UP DATE                     1/79
    SO2 DESIGN REMOVAL EFFICIENCY - %               42.50
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.50
    ABSORBER SPARE CAPACITY INDEX - %              100.0
    ABSORBER SPARE COMPONENTS INDEX                  1.0

** WATER LOOP
    TYPE                                        OPEN
    FRESH MAKE-UP WATER - LITER/S                  115.9       ( 1840 GPM)

** DISPOSAL
    TYPE                                        POND


-----------------------------------------PERFORMANCE DATA---------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  SYSTEM     91.0         58.3        88.8        57.3     97.40        744   731    426  56.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING JANUARY SOME OUTAGE TIME WAS DUE TO A PUMP MALFUNCTION.

                            OUTAGE TIME WAS ALSO CAUSED BY A BROKEN FEED BELT TO THE LIMESTONE BALL
                            MILL.

 2/80  SYSTEM     92.8         96.7        92.8        92.8     97.40        696   668    646  87.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING FEBRUARY OUTAGE TIME RESULTED FROM AN ESP FAILURE.

                            FORCED OUTAGE TIME WAS ALSO CAUSED BY A PUMP MALFUNCTION.

 3/80  SYSTEM     99.1         99.1        99.0        99.1                  744   744    738  74.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            SOME OF THE OUTAGE TIME DURING MARCH OCCURRED BECAUSE OF PUMP FAILURES.

                            OUTAGE TIME RESULTED FROM STICKING VALVES AND LIMESTONE FEED-BELT
                            PROBLEMS.

 4/80  SYSTEM     67.2         65.2        65.2        61.4                  720   678    442
```

ARIZONA ELECTRIC POWER COOP: APACHE 2 (CONT.)

```
--------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER   FGD    CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS  HOURS  HOURS  FACTOR
                                                                ----- ----- ----- ------ -----  ------
       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING APRIL THE FGD SYSTEM WAS FORCED DOWN DUE TO PUMP FAILURES AND A
                             RUPTURE IN THE SLURRY RECIRCULATION LINE.

5/80   SYSTEM      90.5         90.5        90.5        90.5                    744    744    673

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING MAY THE UNIT WAS FORCED OFF LINE WHEN THE LIMESTONE CRUSHER
                             MALFUNCTIONED.

                             THE UNIT WAS ALSO FORCED OUT DUE TO PUMP AND VALVE FAILURES.

 /80   SYSTEM
                                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.

7/80   202        100.0           .0
       203         85.0         85.7        85.7          .0
       SYSTEM     100.0         85.7        85.7        85.0
                                                        85.0                    744    738    633   77.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             MODULE 202 WAS AVAILABLE THE ENTIRE MONTH, BUT WAS NOT OPERATED.

                             THE FGD SYSTEM WAS DOWN IN JULY BECAUSE OF A CIRCUIT BREAKER MALFUNCTION.

                             FAILURE OF BOTH THE BYPASS DAMPER AND THE PACKING PUMP ALSO CAUSED OUTAGE
                             TIME DURING THE MONTH.

8/80   202           .0           .0
       203         96.8         66.0        95.2          .0
       SYSTEM      96.8         66.0        95.2        63.3
                                                        63.3                    744    714    471   61.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             TOWER 202 WAS UNAVAILABLE IN AUGUST BECAUSE OF THE LINER BEING REPLACED.

                             A SAMPLE LINE FAILURE CAUSED TOWER 203 TO GO DOWN FOR 24 HOURS.

                             THE OPERATION OF THE FGD SYSTEM WAS REDUCED BECAUSE OF LOW LOAD CAPACITY.

9/80   SYSTEM
                                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.
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                                        SECTION 3
                   DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                    ARIZONA ELECTRIC POWER COOP
PLANT NAME                                      APACHE
UNIT NUMBER                                     3
CITY                                            COCHISE
STATE                                           ARIZONA
GROSS UNIT GENERATING CAPACITY - MW               195.0
NET UNIT GENERATING CAPACITY W/FGD - MW           175.0
EQUIVALENT SCRUBBED CAPACITY - MW                  98.0

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                   23260.        ( 10000 BTU/LB)
    AVERAGE ASH CONTENT - %                         15.00
    AVERAGE MOISTURE CONTENT - %                     9.00
    AVERAGE SULFUR CONTENT - %                        .55
    AVERAGE CHLORIDE CONTENT - %                ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIMESTONE
    SYSTEM SUPPLIER                             RESEARCH-COTTRELL
    NEW/RETROFIT                                NEW
    ENERGY CONSUMPTION - %                           4.1
    INITIAL START-UP DATE                        6/79
    COMMERCIAL START-UP DATE                     4/79
    SO2 DESIGN REMOVAL EFFICIENCY - %               42.50
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.50
    ABSORBER SPARE CAPACITY INDEX - %              100.0
    ABSORBER SPARE COMPONENTS INDEX                  1.0

** WATER LOOP
    TYPE                                        OPEN
    FRESH MAKE-UP WATER - LITER/S                  340.2        ( 5400 GPM)

** DISPOSAL
    TYPE                                        POND


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  SYSTEM      91.7         91.7        91.7         91.7   97.40         744   744    682  89.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING JANUARY SOME OUTAGE TIME WAS DUE TO A PUMP MALFUNCTION.

                           OUTAGE TIME WAS ALSO CAUSED BY A BROKEN FEED BELT TO THE LIMESTONE BALL
                           MILL.

 2/80  SYSTEM      95.6         74.1        96.0         71.4   97.40         696   671    497  83.5

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING FEBRUARY OUTAGE TIME RESULTED FROM AN ESP FAILURE.

                           FORCED OUTAGE TIME WAS ALSO CAUSED BY A PUMP MALFUNCTION.

 3/80  SYSTEM      90.9         90.9        90.9         90.9                 744   744    677  91.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           SOME OF THE OUTAGE TIME DURING MARCH OCCURRED BECAUSE OF PUMP FAILURE.

                           OUTAGE TIME RESULTED FROM STICKING VALVES AND LIMESTONE FEED-BELT
                           PROBLEMS.

 4/80  SYSTEM      99.0         96.9        96.9         30.6                 720   227    220
```

ARIZONA ELECTRIC POWER COOP: APACHE 3 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE FGD SYSTEM WAS FORCED DOWN DUE TO PUMP FAILURES AND A RUPTURE IN THE SLURRY RECIRCULATION LINE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	.0	.0		.0			744	39	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM WERE DOWN FOR A SCHEDULED OVERHAUL. THE LINERS IN THE ABSORBER QUENCHER HAD TO BE REPAIRED. THE BOILER RETURNED TO SERVICE BEFORE REPAIR WORK FOR THE FGD SYSTEM WAS COMPLETE. THE FGD SYSTEM WAS UNAVAILABLE IN MAY BECAUSE OF THIS OVERHAUL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	302	29.0	30.0	90.0	29.0						
	303	.0	.0		.0						
	SYSTEM	29.0	30.0	90.0	29.0			744	721	216	49.3

** PROBLEMS/SOLUTIONS/COMMENTS

BOTH MODULES WERE UNAVAILABLE BECAUSE OF REPLACEMENT OF THE ABSORBER LINER. MODULE 302 WAS OUT OF SERVICE FOR 22 DAYS, WHILE MODULE 303 WAS OUT OF SERVICE DURING ALL OF JULY.

A PACKING PUMP FAILURE CAUSED THE FGD SYSTEM TO GO DOWN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	302	98.5	47.8	96.3	38.4						
	303	98.5	19.3	91.3	15.5						
	SYSTEM	98.5	67.1	94.8	54.0			744	599	402	41.5

** PROBLEMS/SOLUTIONS/COMMENTS

TOWER 302 WAS UNAVAILABLE DURING PART OF AUGUST BECAUSE OF A QUENCHER PUMP FAILURE.

DUE TO A SAMPLING LINE FAILURE IN AUGUST, TOWER 303 WAS SHUT DOWN FOR PART OF THE MONTH.

THE REDUCED RATE OF FGD OPERATION IN AUGUST WAS A RESULT OF BOILER UNIT PROBLEMS AND REDUCED LOAD CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	CHOLLA	
UNIT NUMBER	1	
CITY	JOSEPH CITY	
STATE	ARIZONA	
GROSS UNIT GENERATING CAPACITY - MW	119.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	115.0	
EQUIVALENT SCRUBBED CAPACITY - MW	119.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23609.	(10150 BTU/LB)
AVERAGE ASH CONTENT - %	13.50	
AVERAGE MOISTURE CONTENT - %	15.00	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.02	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.4	
INITIAL START-UP DATE	10/73	
COMMERCIAL START-UP DATE	12/73	
SO2 DESIGN REMOVAL EFFICIENCY - %	58.50	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	80.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	7.6	(120 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/79	A		77.0		77.0			720	720	632	
	B		98.5		98.5						
	SYSTEM		87.8		87.8						
12/79	A		94.0		94.0			744	744	672	
	B		86.7		86.7						
	SYSTEM		90.4		90.4						
1/80	A		95.5		95.5			744	744	724	91.7
	B		99.1		99.1						
	SYSTEM		97.3		97.3						
2/80	A	100.0	100.0	100.0	100.0			696	696	694	92.1
	B		99.4		99.4						
	SYSTEM		99.7		99.7						
3/80	A		99.1		99.1			744	744	715	88.6
	B		93.1		93.1						
	SYSTEM		96.1		96.1						

** PROBLEMS/SOLUTIONS/COMMENTS

NO FORCED OUTAGES WERE REPORTED BY THE UTILITY FOR THE FIVE MONTH PERIOD OF NOVEMBER 1979 THROUGH MARCH 1980. SOME SCHEDULED OUTAGE TIME WAS REQUIRED FOR REPAIR OF THE REHEATER DUCTWORK.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	100.0	100.0	100.0	100.0			720	720	720	82.8
	B	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	100.0	100.0	100.0						

ARIZONA PUBLIC SERVICE: CHOLLA 1 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

NO FGD-RELATED PROBLEMS WERE REPORTED FOR THE MONTH OF APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	100.0	100.0	100.0	100.0						
	B	99.2	99.2	99.2	99.2						
	SYSTEM	99.6	99.6	99.6	99.6			744	744	741	87.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE B-MODULE OUTAGE TIME IN MAY WAS CAUSED BY PROBLEMS WITH THE BOOSTER FAN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	100.0	80.7	100.0	68.7						
	B	99.3	87.7	99.1	74.6						
	SYSTEM	99.7	84.2	99.6	71.7			720	613	516	67.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE SCHEDULED MAINTENANCE WAS PERFORMED ON THE BOILER. THE SCHEDULED OUTAGE TIME WAS NECESSARY TO ACID WASH THE CONDENSERS.

THE ONLY FGD-RELATED OUTAGE OCCURRED WHEN A BLOCK VALVE MALFUNCTIONED. THE B-MODULE WAS OUT OF SERVICE FOR FIVE HOURS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	100.0	100.0	100.0	100.0						
	B	100.0	98.6	100.0	98.6						
	SYSTEM	100.0	99.3	100.0	99.3			744	744	739	95.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME IN JULY. MODULE B WAS NOT UTILIZED FOR PART OF THE MONTH DUE TO LOW BOILER LOAD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DATA FOR THE AUGUST AND SEPTEMBER MONTHS WERE NOT AVAILABLE DUE TO PERSONNEL CHANGES.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE	
PLANT NAME	CHOLLA	
UNIT NUMBER	2	
CITY	JOSEPH CITY	
STATE	ARIZONA	
GROSS UNIT GENERATING CAPACITY - MW	264.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	235.0	
EQUIVALENT SCRUBBED CAPACITY - MW	264.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23609.	(10150 BTU/LB)
AVERAGE ASH CONTENT - %	13.50	
AVERAGE MOISTURE CONTENT - %	15.00	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.02	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/78	
COMMERCIAL START-UP DATE	6/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	75.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.70	
ABSORBER SPARE CAPACITY INDEX - %	33.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	7.6	(120 GPM)
** DISPOSAL		
TYPE	UNLINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION IS AVAILABLE AS OF YET WITH RESPECT TO THE CHOLLA 2 FGD OPERATIONS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM PERFORMANCE DATA FOR THE APRIL-JUNE PERIOD ARE NOT AVAILABLE AT THIS TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

ARIZONA PUBLIC SERVICE: CHOLLA 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT AVAILABLE FOR RELEASE AT THIS TIME.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE
PLANT NAME	FOUR CORNERS
UNIT NUMBER	1
CITY	FARMINGTON
STATE	NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW	175.0
NET UNIT GENERATING CAPACITY W/FGD - MW	175.0
EQUIVALENT SCRUBBED CAPACITY - MW	175.0

** FUEL DATA

FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20004. (8600 BTU/LB)
AVERAGE ASH CONTENT - %	22.00
AVERAGE MOISTURE CONTENT - %	12.30
AVERAGE SULFUR CONTENT - %	.75
AVERAGE CHLORIDE CONTENT - %	.07

** GENERAL EMISSION CONTROL SYSTEM DATA

GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	11/79
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/79	SYSTEM							720			
12/79	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

ARIZONA PUBLIC SERVICE: FOUR CORNERS 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.
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                                   SECTION 3
              DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                      ARIZONA PUBLIC SERVICE
PLANT NAME                                        FOUR CORNERS
UNIT NUMBER                                       2
CITY                                              FARMINGTON
STATE                                             NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW                 175.0
NET UNIT GENERATING CAPACITY W/FGD - MW             175.0
EQUIVALENT SCRUBBED CAPACITY - MW                   175.0

** FUEL DATA
    FUEL TYPE                                     COAL
    FUEL GRADE                                    SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                     20004.        ( 8600 BTU/LB)
    AVERAGE ASH CONTENT - %                          22.00
    AVERAGE MOISTURE CONTENT - %                     12.30
    AVERAGE SULFUR CONTENT - %                         .75
    AVERAGE CHLORIDE CONTENT - %                       .07

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                          WET SCRUBBING
    PROCESS TYPE                                  LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                               CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                  RETROFIT
    ENERGY CONSUMPTION - %                        *******
    INITIAL START-UP DATE                         11/79
    COMMERCIAL START-UP DATE                      **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %                80.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.30
    ABSORBER SPARE CAPACITY INDEX - %                  .0
    ABSORBER SPARE COMPONENTS INDEX                    .0


-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

11/79  SYSTEM                                                                720

12/79  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                      INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

 1/80  SYSTEM                                                                744

 2/80  SYSTEM                                                                696

 3/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                      THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

 4/80  SYSTEM                                                                720

 5/80  SYSTEM                                                                744

 6/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                      ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY
                      REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.

 7/80  SYSTEM                                                                744

 8/80  SYSTEM                                                                744

 9/80  SYSTEM                                                                720
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ARIZONA PUBLIC SERVICE: FOUR CORNERS 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

      ** PROBLEMS/SOLUTIONS/COMMENTS

                            THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	ARIZONA PUBLIC SERVICE
PLANT NAME	FOUR CORNERS
UNIT NUMBER	3
CITY	FARMINGTON
STATE	NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW	229.0
NET UNIT GENERATING CAPACITY W/FGD - MW	229.0
EQUIVALENT SCRUBBED CAPACITY - MW	229.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20004. (8600 BTU/LB)
AVERAGE ASH CONTENT - %	22.00
AVERAGE MOISTURE CONTENT - %	12.30
AVERAGE SULFUR CONTENT - %	.75
AVERAGE CHLORIDE CONTENT - %	.07
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	11/79
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/79	SYSTEM							720			
12/79	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS STARTED IN NOVEMBER 1979.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS PRESENTLY IN THE SHAKEDOWN/DEBUGGING PHASE OF OPERATION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH THE FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY REPORTED THAT IT IS UNAVAILABLE FOR RELEASE AT THIS TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

ARIZONA PUBLIC SERVICE: FOUR CORNERS 3 (CONT.)

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-------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE THIRD QUARTER 1980.

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COMPANY NAME                                       BASIN ELECTRIC POWER COOP
PLANT NAME                                         LARAMIE RIVER
UNIT NUMBER                                        1
CITY                                               WHEATLAND
STATE                                              WYOMING
REGULATORY CLASSIFICATION                          C
PARTICULATE EMISSION LIMITATION - NG/J               43.          (  .100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                       86.          (  .200 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                 1500.0
GROSS UNIT GENERATING CAPACITY - MW                 570.0
NET UNIT GENERATING CAPACITY W/FGD - MW             500.0
NET UNIT GENERATING CAPACITY WO/FGD - MW            500.0
EQUIVALENT SCRUBBED CAPACITY - MW                   570.0

** BOILER DATA
    SUPPLIER                                       BABCOCK & WILCOX
    TYPE                                           PULVERIZED COAL
    SERVICE LOAD                                   BASE
    COMMERCIAL SERVICE DATE                         4/80
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S           1321.32       (2800000 ACFM)
    FLUE GAS TEMPERATURE - C                          56.1        ( 133 F)
    STACK HEIGHT - M                                 183.         ( 600 FT)
    STACK TOP DIAMETER - M                             8.7        ( 28.6 FT)

** FUEL DATA
    FUEL TYPE                                      COAL
    FUEL GRADE                                     SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                      18931.        (  8139 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                    ******
    AVERAGE ASH CONTENT - %                            7.89
    RANGE ASH CONTENT - %                          ******
    AVERAGE MOISTURE CONTENT - %                      28.92
    RANGE MOISTURE CONTENT - %                     ******
    AVERAGE SULFUR CONTENT - %                          .81
    RANGE SULFUR CONTENT - %                       .15-.81
    AVERAGE CHLORIDE CONTENT - %                        .04
    RANGE CHLORIDE CONTENT - %                     ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT             THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                           WET SCRUBBING
    PROCESS TYPE                                   LIMESTONE
    SYSTEM SUPPLIER                                RESEARCH-COTTRELL
    A-E FIRM                                       BURNS & MCDONNELL
    CONSTRUCTION FIRM                              RESEARCH-COTTRELL
    DEVELOPMENT LEVEL                              FULL SCALE
    NEW/RETROFIT                                   NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %         99.60
    SO2 DESIGN REMOVAL EFFICIENCY - %                 90.00
    COMMERCIAL DATE                                 7/80
    INITIAL START-UP                                7/80
    CONSTRUCTION INITIATION                         1/78
    CONTRACT AWARDED                                1/77
    LETTER OF INTENT SIGNED                        12/76

** ESP
    NUMBER                                          1
    TYPE                                           COLD SIDE
    SUPPLIER                                       BABCOCK & WILCOX
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.6
    FLUE GAS CAPACITY - CU.M/S                     1085.4         (2300000 ACFM)
    FLUE GAS TEMPERATURE - C                        141.1         (  286 F)
    PRESSURE DROP - KPA                            *******        (***** IN-H2O)
    PARTICULATE OUTLET LOAD - G/CU.M                   .02        (    .01 GR/SCF)

** ABSORBER
    NUMBER                                          5
    TYPE                                           GRID/SPRAY TOWER
    INITIAL START UP                                4/80
    SUPPLIER                                       RESEARCH-COTTRELL
    DIMENSIONS - FT                                30 X 30 X 88
    SHELL MATERIAL                                 316L SS [TOP] UDDEHOLM 904L [BOTTOM]
    BOILER LOAD/ABSORBER - %                          25.0
    GAS FLOW - CU.M/S                              1085.37        (2300000 ACFM)
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BASIN ELECTRIC POWER COOP: LARAMIE RIVER 1 (CONT.)

     GAS TEMPERATURE - C                          141.1        (  286 F)
     L/G RATIO - L/CU.M                             8.0        ( 60.0 GAL/1000ACF)
     SUPERFICAL GAS VELOCITY - M/SEC                3.0        ( 10.0 FT/S)
     PARTICULATE INLET LOAD - G/CU.M                 .0        (  .015 GR/SCF)
     PARTICULATE INLET LOAD - NG/J                 21.         (  .050 LB/MMBTU)
     PARTICULATE OUTLET LOAD- G/CU.M                 .0        (  .015 GR/SCF)
     PARTICULATE OUTLET LOAD - NG/J                21.         (  .050 LB/MMBTU)
     PARTICULATE REMOVAL EFFICIENCY - %              .0
     SO2 INLET CONCENTRATION - PPM                800
     SO2 INLET CONCENTRATION -NG/J              *****          (***** LB/MMBTU)
     SO2 OUTLET CONTRATION - PPM                   80
     SO2 OUTLET CONCENTRATION- NG/J             *****          (***** LB/MMBTU)
     SO2 DESIGN REMOVAL EFFICIENCY - %             90.0
     ABSORBER SPARE CAPACITY INDEX - %             25.0
     ABSORBER SPARE COMPONENT INDEX                 1.0

 ** CENTRIFUGE
     INLET SOLIDS - %                              35.0
     OUTLET SOLIDS - %                             60.0

 ** FANS
     NUMBER                                      2
     TYPE                                       INDUCED DRAFT
     SERVICE - WET/DRY                          DRY

 ** MIST ELIMINATOR
     TYPE                                       CHEVRON
     CONFIGURATION                              VERTICAL
     NUMBER OF STAGES                              1
     NUMBER OF PASSES                              1

 ** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                          PH, SOLIDS, SO2 INLET, ACFM, SO2 OUTLET
     CONTROL MANNER                             AUTOMATIC

 ** THICKENER
     NUMBER                                      3                          6
     CONSTRUCTION MATERIAL                      CONCRETE
     DIAMETER - M                                  33.5        (110 FT)

 ** WATER LOOP
     TYPE                                       CLOSED
     FRESH MAKEUP WATER ADDITION - LITERS/S        16.9        (  269 GPM)

 ** REAGENT PREPARATION EQUIPMENT
     NUMBER OF BALL MILLS                          2
     BALL MILL CAPACITY- M T/H                     13.6        ( 15.0 TPH)
     REAGENT PRODUCT - % SLURRY SOLIDS            30.0

 ** BYPRODUCTS
     DISPOSITION                                LANDFILL

 ** TREATMENT
     TYPE                                       FORCED OXIDATION

 ** DISPOSAL
     NATURE                                     FINAL
     TYPE                                       LANDFILL
     LOCATION                                   ON SITE
     TRANSPORTATION                             CONVEYOR BELT


----------------------------------------PERFORMANCE DATA---------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 7/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE UNIT BEGAN INITIAL AND COMMERCIAL OPERATIONS ON JULY 1, 1980.  NO MAJOR
                         PROBLEMS WERE REPORTED DURING STARTUP.

 5/80  SYSTEM                                                                744
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BASIN ELECTRIC POWER COOP: LARAMIE RIVER 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS STILL IN THE STARTUP PHASE OF OPERATIONS. NO PERFORMANCE DATA ARE CURRENTLY AVAILABLE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	BIG RIVERS ELECTRIC	
PLANT NAME	GREEN	
UNIT NUMBER	1	
CITY	SEBREE	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	242.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	200.0	
EQUIVALENT SCRUBBED CAPACITY - MW	242.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22678.	(9750 BTU/LB)
AVERAGE ASH CONTENT - %	20.00	
AVERAGE MOISTURE CONTENT - %	11.00	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AMERICAN AIR FILTER	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	12/79	
COMMERCIAL START-UP DATE	12/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	30.0	
ABSORBER SPARE COMPONENTS INDEX	.4	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE FIRST QUARTER, 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	65.0	56.0	78.8	45.0						
	B	65.0	56.0	79.0	45.0						
	SYSTEM	65.0	56.0	79.0	45.0			720	576	324	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FOLLOWING FIVE OUTAGES OCCURRED IN APRIL AND ACCOUNTED FOR THE LOW AVAILABILITY OF THE FGD SYSTEM.

1. LOW ADDITIVE IN TANK
2. INSTRUMENT TROUBLE
3. WATER IN THE PANEL
4. LOW ON LIME IN THE HOLDING TANKS
5. THE ESPS TRIPPED

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	73.7	76.1	79.0	73.7						
	B	73.7	76.0	78.9	73.5						
	SYSTEM	73.7	76.1	79.0	73.7			744	720	548	

BIG RIVERS ELECTRIC: GREEN 1 (CONT.)

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------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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       ** PROBLEMS/SOLUTIONS/COMMENTS

                            DURING MAY THE FGD SYSTEM WAS OFF LINE FOR APPROXIMATELY 548 HOURS DUE
                            TO THE FOLLOWING PROBLEMS.
                                 1. SULFUR OXIDES TOO HIGH
                                 2. LOW LEVEL IN ADDITIVE TANK
                                 3. INSTRUMENT TROUBLE
                                 4. SCHEDULED MAINTENANCE OUTAGE
                                 5. SOLIDS ON CARRY OVER
                                 6. SOLID WASTE PROBLEM
                                 7. UNIT TRIPPED
                                 8. CONSTRUCTION WORK

 6/80  SYSTEM
                                                                              720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF JUNE.

 7/80  SYSTEM
                                                                              744
 8/80  SYSTEM
                                                                              744
 9/80  SYSTEM
                                                                              720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            NO INFORMATION WAS AVAILABLE FOR THE THIRD QUARTER 1980.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	CENTRAL ILLINOIS LIGHT	
PLANT NAME	DUCK CREEK	
UNIT NUMBER	1	
CITY	CANTON	
STATE	ILLINOIS	
GROSS UNIT GENERATING CAPACITY - MW	416.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	378.0	
EQUIVALENT SCRUBBED CAPACITY - MW	416.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	24181.	(10396 BTU/LB)
AVERAGE ASH CONTENT - %	9.77	
AVERAGE MOISTURE CONTENT - %	15.43	
AVERAGE SULFUR CONTENT - %	3.66	
AVERAGE CHLORIDE CONTENT - %	.06	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	ENVIRONEERING, RILEY STOKER	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	2.9	
INITIAL START-UP DATE	7/76	
COMMERCIAL START-UP DATE	8/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	37.8	(600 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	24.8	27.0	29.8	24.8						
	B	58.5	63.6	65.9	58.5						
	C	17.1	18.6	20.3	17.1						
	D	29.2	31.8	35.3	29.3						
	SYSTEM	32.4	35.3	37.8	32.4			744	684	241	81.6

** PROBLEMS/SOLUTIONS/COMMENTS

MOST OF THE JANUARY OUTAGE TIME WAS REQUIRED FOR RECYCLE TANK COVERING WORK.

THE MIST ELIMINATOR SECTION PLUGGED ALONG WITH THE NOZZLES HINDERING SYSTEM OPERATIONS. THE MIST ELIMINATOR DRAIN LINE WAS MODIFIED ALSO CAUSING OUTAGE TIME.

OTHER PROBLEMS ENCOUNTERED DURING THE MONTH INCLUDED A PLUGGED LIMESTONE FEEDER, INLET DAMPER PROBLEMS, SLURRY SUPPLY HEADER LEAKS AND STORAGE PUMP DISCHARGE VALVE REPAIRS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	11.8	11.8	12.5	11.8						
	B	72.7	72.7	73.5	72.7						
	C	70.7	70.7	71.5	70.7						
	D	41.3	41.3	47.9	41.3						
	SYSTEM	49.1	49.1	51.4	49.1			696	696	342	73.5

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY SOME OUTAGE TIME WAS DUE TO MODULE D CLEANING AND THE CLEANING OF THE MODULE D MIST ELIMINATOR SECTION.

THE INLET DAMPER DRIVE WAS REPLACED DURING THE MONTH.

REPAIR OF THE FIBERGLASS ON THE SLURRY RECYCLE LINE HINDERED OPERATIONS DURING THIS MONTH.

THE MODULES A AND D RECYCLE DISCHARGE VALVE WERE REPLACED CAUSING EXTENSIVE DOWN TIME.

3/80	A	52.9	62.5	64.7	52.9						
	B	73.2	86.6	86.9	73.2						
	C	51.0	60.3	60.5	51.0						
	D	34.0	40.2	45.9	34.0						
	SYSTEM	52.8	62.4	65.1	52.8			744	629	393	68.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH NEW RECYCLE PUMP DISCHARGE VALVES WERE INSTALLED IN ORDER TO ELIMINATE RESTRICTED FLOW OF THE OLD VALVES.

CARRIER BEARINGS ON THE INLET DAMPER WERE REPLACED IN ORDER TO MAINTAIN MODULE ISOLATION CAPABILITY.

THE MIST ELIMINATOR WASH SYSTEM WAS CONVERTED TO RETURN WATER IN ORDER TO ACHIEVE A HIGHER QUALITY ELIMINATION WASH WATER.

FIBERGLASS LINES ON THE RECYCLE PUMP DISCHARGE WERE ALSO REPAIRED DURING EXTENSIVE

4/80	A	53.0	81.7	95.9	52.9						
	B	54.2	83.6	87.5	54.2						
	C	57.2	88.3	95.3	57.2						
	D	26.0	40.1	71.9	26.0						
	SYSTEM	47.6	73.4	89.2	47.6			720	466	342	35.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE MAJOR PROBLEM HINDERING SYSTEM OPERATIONS DURING APRIL WAS THE REBUILD OF THE RECYCLE TANK MIXER.

MINOR PROBLEMS DURING THE MONTH WERE CAUSED BY THE INOPERABILITY OF THE LIMESTONE HANDLING SYSTEM.

5/80	A	44.6	68.6	72.0	44.6						
	B	45.7	70.3	73.5	45.7						
	C	34.7	53.3	59.1	34.7						
	D	43.6	67.0	73.9	43.6						
	SYSTEM	42.1	64.8	69.7	42.1			744	484	314	49.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY REPAIRS WERE MADE TO THE RECYCLE TANK RUBBER LINER.

EXPANSION JOINT LEAKS WERE ALSO REPAIRED DURING THE MONTH.

OTHER OPERATIONAL PROBLEMS INCLUDED THE REPLACEMENT OF THE LIMESTONE STORAGE TANK MIXER MOTOR, MODIFICATION OF ROD DECKS TO REDUCE SYSTEM DIFFERENTIAL PRESSURE AND REPAIR OF THE LIMESTONE FEEDER SYSTEM.

6/80	A	87.6	82.3	87.1	82.1						
	B	86.8	82.6	86.0	82.3						
	C	84.5	81.4	84.3	81.1						
	D	80.0	73.1	75.8	72.9						
	SYSTEM	84.8	79.9	84.3	79.6			720	718	573	78.5

CENTRAL ILLINOIS LIGHT: DUCK CREEK 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

A LEAK WAS REPAIRED IN THE SLURRY SUPPLY HEADER DURING JUNE.

WORK CONTINUED ON THE MODIFICATIONS BEING DONE ON THE ROD DECKS IN THE ABSORBER MODULES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	91.2	81.0	87.6	70.1						
	B	83.5	70.0	80.0	60.6						
	C	90.5	78.8	86.4	68.2						
	D	87.5	74.9	85.4	64.8						
	SYSTEM	88.2	76.2	84.9	65.9			744	644	490	67.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY FGD SYSTEM OUTAGE TIME RESULTED FROM THE NECESSARY REPAIR OF THE SLURRY SUPPLY LINE AND REPAIR OF THE MALFUNCTIONING CLUTCH IN THE MILL SYSTEM.

ADDITIONAL OUTAGE TIME OCCURRED SO REPAIRS TO THE 1B STORAGE TANK PUMP DISCHARGE VALVES AND THE STORAGE TANK MIXER MOTOR COULD BE COMPLETED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	88.6	85.4	92.7	81.9						
	B	91.4	86.3	90.8	82.7						
	C	91.3	84.6	88.9	81.0						
	D	90.6	85.1	90.1	81.6						
	SYSTEM	90.5	85.4	90.7	81.9			744	713	609	76.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE SLURRY SUPPLY ISOLATION VALVE WAS REPAIRED IN AUGUST.

THE POND WATER RETURN LINE WAS ALSO REPAIRED DURING THE MONTH.

REPAIRS WERE MADE TO THE ELECTRICAL SYSTEM AFTER A POWER FAILURE IN THE WASTEWATER BUILDING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	43.1	39.2	41.5	39.2						
	B	47.8	47.2	48.2	47.2						
	C	45.6	43.2	45.9	43.2						
	D	46.3	46.0	47.6	46.0						
	SYSTEM	45.6	43.9	45.9	43.9			720	720	316	81.3

** PROBLEMS/SOLUTIONS/COMMENTS

MAJOR PROBLEMS DURING SEPTEMBER INCLUDED REPAIR OF THE LIMESTONE BALL MILL. AFTER IT WAS REPAIRED, THE BALL MILL MOTOR BURNED OUT AND HAD TO BE REPLACED.

SLURRY CONTAMINATION OF THE MILL BEARING OIL AND REPAIR OF THE RECYCLE PUMP SUCTION SCREEN CAUSED THE FGD SYSTEM TO BE DOWN FOR SEVERAL HOURS DURING THE MONTH.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	CENTRAL ILLINOIS PUBLIC SERV	
PLANT NAME	NEWTON	
UNIT NUMBER	1	
CITY	NEWTON	
STATE	ILLINOIS	
GROSS UNIT GENERATING CAPACITY - MW	617.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	575.0	
EQUIVALENT SCRUBBED CAPACITY - MW	617.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25353.	(10900 BTU/LB)
AVERAGE ASH CONTENT - %	12.70	
AVERAGE MOISTURE CONTENT - %	9.50	
AVERAGE SULFUR CONTENT - %	2.25	
AVERAGE CHLORIDE CONTENT - %	.20	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	DUAL ALKALI	
SYSTEM SUPPLIER	BUELL DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	2.4	
INITIAL START-UP DATE	9/79	
COMMERCIAL START-UP DATE	12/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	68.3	57.1	63.5	55.5						
	B	66.4	60.6	64.9	58.9						
	C	52.2	48.8	60.5	47.4						
	D	21.0	19.1	26.3	18.5						
	SYSTEM	52.0	46.4	53.8	45.1			744	723	336	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY TESTS WERE CONDUCTED TO CERTIFY THE GAS EMISSIONS MONITOR AT NEWTON.

PRESATURATOR CORROSION AND EXPANSION JOINT REPAIRS AND A DEPLETION OF THE FLYASH USED FOR SLUDGE STABILIZATION ACCOUNTED FOR THE LOW JANUARY DEPENDABILITY FIGURES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	61.1	42.4	45.0	42.4						
	B	74.4	55.7	57.7	55.7						
	C	78.2	58.5	59.1	58.5						
	D	.0	.0	.0	.0						
	SYSTEM	53.4	39.2	40.4	39.2			696	696	273	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY THE D-MODULE WAS UNAVAILABLE DUE TO THE COLLAPSE OF THE PRECOOLER MIST ELIMINATORS CAUSED BY A TEMPERATURE EXCURSION.

REPAIR WORK ON THE PRESATURATOR CORROSION AND EXPANSION JOINTS AS WELL AS THE FLYASH DEPLETION PROBLEM CONTINUED TO YIELD LOW DEPENDABILITY FIGURES FOR FEBRUARY.

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	53.4	52.6	53.1	52.3						
	B	47.0	42.3	48.0	42.1						
	C	44.5	41.1	46.5	41.0						
	D	.0	.0	.0	.0						
	SYSTEM	36.2	34.0	36.9	33.9			744	740	252	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER, 1980, THE FOLLOWING PROBLEMS WERE ENCOUNTERED:

- THE VALVES AND PIPING IN THE PRECOOLER LOOP EXPERIENCED CORROSION.
- THE MIST ELIMINATOR ON THE D MODULE FAILED.
- THE FLY ASH SUPPLIES DEPLETED.
- RUBBER LINING AND DUCTWORK LINING FAILURES OCCURRED.
- BOOSTER FAN EXPANSION JOINT FAILURE OCCURRED.
- THE THICKENER EXPERIENCED PLUGGING.

THESE COMBINED PROBLEMS ACCOUNTED FOR THE LOW MARCH PERFORMANCE FIGURES. FOR THE QUARTER, THE TOTAL SYSTEM WAS AVAILABLE 47.2% AND WAS UTILIZED 39.4% OF THE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	33.8	31.3	31.4	31.3						
	B	35.4	25.8	25.8	25.8						
	C	37.4	35.6	35.6	35.6						
	D	26.1	21.8	21.8	21.8						
	SYSTEM	33.2	28.6	28.6	28.6			720	720	206	

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEWTON 1 FGD SYSTEM WAS OUT OF SERVICE DURING THE FIRST 12 DAYS OF APRIL FOR NECESSARY REPAIRS ON THE OUTLET DUCT LININGS. THE UTILITY INDICATED THAT THE LINING FAILURES MAY HAVE RESULTED FROM IMPROPER APPLICATION.

DURING THE LAST 18 DAYS OF APRIL MINOR PROBLEMS WERE EXPERIENCED WITH THE OCCURANCE OF PLUGGING IN THE SODIUM CARBONATE THICKENER AND CORROSION OF THE VALVES IN THE PRESATURATOR CIRCUIT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	.0	.0	.0	.0						
	B	9.7	9.6	9.6	6.2						
	C	9.7	9.6	9.6	6.2						
	D	.0	.0	.0	.0						
	SYSTEM	4.8	4.8	4.8	3.1			744	477	23	45.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY, THE FGD SYSTEM WAS DOWN BECAUSE THE FLUIDIZING STONES WERE CAKED WITH FLY ASH. THIS WAS CAUSED BY IMPROPER WIRING OF THE HEATER WHICH BLOWS OVER THE STONES. THE HEATER WAS REWIRED AND THE FLUIDIZING STONES REPLACED. FLUIDIZING STONES ARE LOCATED IN THE FLYASH SILO. HEATED AIR PASSES THROUGH THESE POROUS STONES TO AERATE OR "FLUIDIZE" THE FLYASH SO THAT IT CAN BE CONVEYED TO THE FLYASH/SLUDGE MIXER. WHEN THE FLYASH SUPPLY IS DEPLETED OR THE MATERIAL CANNOT BE DELIVERED TO THE MIXER THE SCRUBBING SYSTEM IS SHUT DOWN. THE SLUDGE MUST BE TREATED WITH FLYASH BEFORE DISPOSAL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	.0	.0	.0	.0						
	B	40.3	40.3	40.3	40.3						
	C	40.4	40.4	40.4	40.4						
	D	.0	.0	.0	.0						
	SYSTEM	20.2	20.2	20.2	20.2			720	720	145	63.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE A AND D MODULES WERE UNAVAILABLE FOR OPERATION BECAUSE THE MIST ELIMINATORS COLLAPSED.

THE SYSTEM WAS SHUTDOWN DURING THE FIRST HALF OF THE MONTH TO REPAIR THE DRY FLYASH COLLECTION SYSTEM WHICH ACCOUNTED FOR THE LOW B AND C MODULE FIGURES.

CENTRAL ILLINOIS PUBLIC SERV: NEWTON 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	3.5	3.7	3.7	3.5						
	B	3.6	3.9	3.9	3.6						
	C	.0	.0	.0	.0						
	D	.0	.0	.0	.0						
	SYSTEM	1.8	1.9	1.9	1.8			744	698	13	67.8

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY PROBLEMS WERE ENCOUNTERED WITH THE MIST ELIMINATORS.

SOME OF THE SYSTEM OUTAGE TIME RESULTED FROM REPAIRS MADE NECESSARY BY THE OCCURRENCE OF CORROSION IN THE PRESATURATOR.

SCRUBBER PLUGGING DURING JULY CONTRIBUTED TO THE LOW FGD SYSTEM AVAILABILITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	.0	.0	.0	.0						
	B	64.7	50.2	50.2	49.3						
	C	51.2	34.1	36.9	33.5						
	D	37.6	21.9	24.0	21.5						
	SYSTEM	53.8	36.4	39.9	35.8			744	731	266	68.2

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING PROBLEMS WITHIN THE FGD SYSTEM WERE THE CAUSE OF DOWN TIME IN AUGUST.

BECAUSE OF CHANGES IN SYSTEM OPERATIONS, ONLY 3 MODULES ARE NEEDED TO MEET CURRENT SO2 REGULATIONS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	69.0	20.3	48.6	10.0						
	B	99.6	74.6	80.3	36.8						
	C	96.9	35.8	66.8	17.6						
	D	99.6	80.8	80.8	39.9						
	SYSTEM	99.1	67.8	82.5	33.4			720	355	241	33.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS TAKEN OUT OF SERVICE ON SEPTEMBER 16, 1980 FOR A SCHEDULED MAINTENANCE OUTAGE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLORADO UTE ELECTRIC ASSN	
PLANT NAME	CRAIG	
UNIT NUMBER	2	
CITY	CRAIG	
STATE	COLORADO	
GROSS UNIT GENERATING CAPACITY - MW	455.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	415.0	
EQUIVALENT SCRUBBED CAPACITY - MW	400.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	16.00	
AVERAGE SULFUR CONTENT - %	.45	
AVERAGE CHLORIDE CONTENT - %	.00	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	PEABODY PROCESS SYSTEMS	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.5	
INITIAL START-UP DATE	12/79	
COMMERCIAL START-UP DATE	5/80	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.80	
ABSORBER SPARE CAPACITY INDEX - %	33.3	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	19.9	(316 GPM)
** DISPOSAL		
TYPE	MINEFILL	

---PERFORMANCE DATA---

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS DOWN AT THE END OF THE PERIOD DUE TO TURBINE RELATED PROBLEMS.

WHEN FULL LOAD OPERATIONS WERE ATTEMPTED CONTROL PROBLEMS WERE ENCOUNTERED WITH THE SCRUBBER.

PROBLEMS WITH OPENING/CLOSING THE BYPASS DAMPER HAVE BEEN ENCOUNTERED. LARGER OPERATORS ARE BEING TESTED THAT MAY SOLVE THE PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS STILL IN THE STARTUP PHASE OF OPERATIONS. TESTING IS BEING PERFORMED ON THE SYSTEM, BUT THERE HAS BEEN NO OPERATIONAL DATA REPORTED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	38.4	27.5	28.4	24.5						
	B	42.5	32.1	33.1	28.5						
	C	47.0	37.2	38.4	33.1						

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COLORADO UTE ELECTRIC ASSN: CRAIG 2 (CONT.)



------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL    PER  BOILER  FGD   CAP.
                                                                SO2  PART.  HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
       D          30.0         18.0        18.6        16.0
       SYSTEM     52.6         38.3        39.5        34.0    64.70              640   661    253  76.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE CRAIG 2 UNIT (BOILER AND SCRUBBER) COMMENCED COMMERCIAL OPERATION ON
                        MAY 4, 1980.

                        NOTE:  THIS SYSTEM EFFECTIVELY HAS ONE SPARE MODULE SO THAT ONLY THREE ARE
                               CURRENTLY NEEDED AT FULL LOAD TO MAINTAIN COMPLIANCE WITH SO2 EMIS-
                               SION REGULATIONS.  WHEN THE CURRENT LOW SULFUR COAL SOURCE IS
                               EXHAUSTED (SEVERAL YEARS FROM NOW) GREATER SCRUBBING CAPACITY WILL
                               BE REQUIRED SO THAT THERE WILL NO LONGER BE AN ENTIRE MODULE SET
                               ASIDE AS A SPARE DURING FULL LOAD BOILER OPERATIONS.  THE "SYSTEM"
                               DEPENDABILITY FACTORS WILL BE BASED ON THREE MODULES UNTIL THE
                               CURRENT COAL SOURCE IS EXHAUSTED.
 6/80  A          47.6         41.2        42.0        37.9
       B          53.9         48.0        48.9        44.2
       C          61.1         55.8        56.9        51.4
       D          34.6         27.0        27.5        24.9
       SYSTEM     65.7         57.3        58.4        52.8    65.70              720   663    380  68.5

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        DURING MAY AND JUNE, PROBLEMS WERE ENCOUNTERED WITH PLUGGING OF THE
                        ABSORBER SPRAY NOZZLES.

                        A PROBLEM WAS ALSO ENCOUNTERED DURING INITIATION OF COMMERCIAL OPERATION
                        WITH A HIGH PH LEVEL IN THE THICKENER UNDERFLOW.

                        THE SCRUBBING SYSTEM IS STILL UNDERGOING SHAKEDOWN OPERATIONS.
 7/80  A          59.1         51.0        51.7        43.8
       B          61.8         54.1        54.9        46.5
       C          37.6         26.0        26.3        22.3
       D          43.7         33.0        33.5        28.4
       SYSTEM     67.4         54.7        55.5        47.0    65.60              744   640    350  65.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        DURING JULY, FGD OUTAGE TIME WAS CAUSED BY PLUGGED ABSORBER SPRAY NOZZLES.
 8/80  A          50.0         46.7        48.3        42.2
       B          50.0         48.4        50.0        43.7
       C          50.0         47.5        49.1        42.9
       D          50.0         52.3        54.0        47.2
       SYSTEM     66.7         65.0        67.1        58.7    65.60              744   672    327  75.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        DURING AUGUST THE FGD SYSTEM EXPERIENCED ASSORTED MECHANICAL PROBLEMS.

                        SPRAY NOZZLE PLUGGING OCCURRED, CAUSING ADDITIONAL OUTAGE TIME WHICH ADDED
                        TO THE LOW AVAILABILITY FACTOR DURING THE MONTH.
 9/80  A          48.6         47.5        48.4        47.1
       B          58.2         58.8        59.9        58.2
       C          61.1         59.6        60.7        59.0
       D          67.4         66.2        67.4        65.6
       SYSTEM     78.4         77.4        78.8        76.6    65.70              720   713    552  85.2

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE SPRAY NOZZLES IN THE ABSORBER MODULE CONTINUED TO PLUG UP DURING SEP-
                        TEMBER.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COLUMBUS & SOUTHERN OHIO ELEC	
PLANT NAME	CONESVILLE	
UNIT NUMBER	5	
CITY	CONESVILLE	
STATE	OHIO	
GROSS UNIT GENERATING CAPACITY - MW	411.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	375.0	
EQUIVALENT SCRUBBED CAPACITY - MW	411.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25237.	(10850 BTU/LB)
AVERAGE ASH CONTENT - %	15.10	
AVERAGE MOISTURE CONTENT - %	7.50	
AVERAGE SULFUR CONTENT - %	4.67	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	3.9	
INITIAL START-UP DATE	1/77	
COMMERCIAL START-UP DATE	2/77	
SO2 DESIGN REMOVAL EFFICIENCY - %	89.50	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	31.5	(500 GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	89.0	38.0	45.0	13.0						
	B	93.0	50.0	59.0	17.0						
	SYSTEM	91.0	44.0	52.0	15.0			744	257	113	21.4

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY A BOILER OUTAGE OCCURRED FROM THE FIRST OF THE MONTH TO JANUARY 20, DURING WHICH TIME MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	90.0	63.0	77.0	31.0						
	B	93.0	69.0	84.0	34.0						
	SYSTEM	92.0	66.0	81.0	33.0			696	343	226	31.4

** PROBLEMS/SOLUTIONS/COMMENTS

A BOILER OUTAGE LASTING APPROXIMATELY 17 DAYS ALSO OCCURRED DURING FEBRUARY.

IN FEBRUARY, MIST ELIMINATOR NOZZLE PLUGGING OCCURRED CAUSING SOME FGD SYSTEM OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	88.0	82.0	82.0	82.0						
	B	88.0	81.0	82.0	81.0						
	SYSTEM	88.0	82.0	82.0	82.0			744	744	606	75.4

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 5 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH PROBLEMS WERE EXPERIENCED WITH THE IUCS SLUDGE STABILIZATION PROCESS AND SOME OUTAGE TIME RESULTED. ALSO DURING MARCH SOME GRID RODS REQUIRED REPLACING AND SOME RUBBER LINER FAILURES OCCURRED.

THE MAJORITY OF THE MARCH FGD SYSTEM OUTAGE TIME WAS DUE TO CONTINUING PROBLEMS WITH THE MIST ELIMINATOR NOZZLES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	94.6	84.4		78.9						
	B	74.9	65.8		61.5						
	SYSTEM	84.7	75.2		70.3			720	673	506	63.1

** PROBLEMS/SOLUTIONS/COMMENTS

CONTINUAL PROBLEMS WITH THE DAMPERS, PRESATURATOR HOSES, AND NOZZLES WERE THE CAUSES OF FGD SYSTEM OUTAGE TIME IN APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	92.1	86.2		86.2						
	B	90.3	84.3		84.3						
	SYSTEM	91.3	85.2		85.2			744	744	634	69.5

** PROBLEMS/SOLUTIONS/COMMENTS

IN MAY, CONTROLS AND INSTRUMENTATION DEVELOPED PROBLEMS THAT CAUSED SOME OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	89.6	71.0		70.7						
	B	94.3	74.8		74.4						
	SYSTEM	86.4	72.9		72.6			720	717	523	65.1

** PROBLEMS/SOLUTIONS/COMMENTS

EXTERNAL CAUSES (IUCS DISPOSAL FACILITY, LOW UNIT DEMAND, SERVICE WATER PROBLEMS, ETC.) WERE RESPONSIBLE FOR THE MAJORITY OF THE JUNE OUTAGES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	90.6	70.7	72.4	43.8						
	B	88.8	82.0	84.0	50.8						
	SYSTEM	89.7	76.4	78.2	47.3			744	461	352	36.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE PRESATURATOR HOSES AND NOZZLES PLUGGED CAUSING THE UNIT TO SHUT DOWN FOR PART OF JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	98.0	83.5	84.9	48.5						
	B	95.4	88.8	90.4	51.6						
	SYSTEM	96.7	86.2	87.6	50.1			744	432	373	40.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT PROBLEMS WITH THE RECLAIM WATER SYSTEM OCCURRED IN AUGUST CAUSING SOME OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	84.8	73.4	74.4	73.1						
	B	85.9	85.1	86.3	82.0						
	SYSTEM	88.2	79.2	80.3	78.9			720	717	568	71.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE JULY-SEPTEMBER PERIOD INLET DAMPER SEAL LEAKING WAS A MAJOR PROBLEM.

THE PRESATURATOR PROBLEMS CONTINUED IN SEPTEMBER CAUSING ADDITIONAL OUTAGE TIME FOR THE FGD SYSTEM.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME
PLANT NAME                                         COLUMBUS & SOUTHERN OHIO ELEC
UNIT NUMBER                                        CONESVILLE
CITY                                               6
STATE                                              CONESVILLE
GROSS UNIT GENERATING CAPACITY - MW                OHIO
NET UNIT GENERATING CAPACITY W/FGD - MW              411.0
EQUIVALENT SCRUBBED CAPACITY - MW                    375.0
                                                     411.0
** FUEL DATA
   FUEL TYPE
   FUEL GRADE                                      COAL
   AVERAGE HEAT CONTENT - J/G                      BITUMINOUS
   AVERAGE ASH CONTENT - %                          25237.        ( 10850 BTU/LB)
   AVERAGE MOISTURE CONTENT - %                       15.10
   AVERAGE SULFUR CONTENT - %                          7.50
   AVERAGE CHLORIDE CONTENT - %                        4.67
                                                        .01
** GENERAL EMISSION CONTROL SYSTEM DATA
   GENERAL PROCESS TYPE
   PROCESS TYPE                                    WET SCRUBBING
   SYSTEM SUPPLIER                                 LIME
   NEW/RETROFIT                                    AIR CORRECTION DIVISION, UOP
   ENERGY CONSUMPTION - %                          NEW
   INITIAL START-UP DATE                              3.9
   COMMERCIAL START-UP DATE                        6/78
   SO2 DESIGN REMOVAL EFFICIENCY - %               7/78
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %         89.50
   ABSORBER SPARE CAPACITY INDEX - %                   .00
   ABSORBER SPARE COMPONENTS INDEX                     .0
                                                       .0
** WATER LOOP
   TYPE
   FRESH MAKE-UP WATER - LITER/S                   OPEN
                                                     31.5         ( 500 GPM)
** TREATMENT
   TYPE
                                                   POZ-O-TEC
** DISPOSAL
   TYPE
                                                   POND


-----------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
 1/80  A          88.0        74.0        74.0        74.0
       B          89.0        78.0        78.0        78.0
       SYSTEM     89.0        76.0        76.0        76.0
                                                                            744   744    566  73.9
       ** PROBLEMS/SOLUTIONS/COMMENTS

                  NO MAJOR FGD SYSTEM RELATED PROBLEMS WERE REPORTED FOR JANUARY.
 2/80  A          87.0        75.0        78.0        69.0
       B          92.0        81.0        85.0        75.0
       SYSTEM     90.0        78.0        82.0        72.0
                                                                            696   648    503  70.8
       ** PROBLEMS/SOLUTIONS/COMMENTS

                  IN FEBRUARY, MIST ELIMINATOR NOZZLE PLUGGING OCCURRED CAUSING SOME OUTAGE
                  TIME.
 3/80  A          93.0        69.0        69.0        15.0
       B          94.0        76.0        76.0        16.0
       SYSTEM     94.0        73.0        73.0        16.0
                                                                            744   160    117  17.6
       ** PROBLEMS/SOLUTIONS/COMMENTS

                  THE BOILER WENT DOWN ON MARCH 9 FOR A BOILER/TURBINE INSPECTION AND
                  REMAINED OUT OF SERVICE THROUGH THE END OF THE MONTH.
```

COLUMBUS & SOUTHERN OHIO ELEC: CONESVILLE 6 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER   FGD   CAP.
                                                                SO2  PART. HOURS  HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ---- ----- -----  ------ ----- ------

4/80   A          98.8        25.6                    11.1
       B          98.9        54.2                    23.5
       SYSTEM     98.9        40.1                    17.4                    720    312    125   19.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     CONTINUOUS PROBLEMS WITH DAMPERS, PRESATURATOR HOSES, AND NOZZLES
                     ACCOUNTED FOR MOST OF THE APRIL FGD SYSTEM OUTAGES.

5/80   A          96.9        58.3                    55.0
       B          96.1        33.8                    31.9
       SYSTEM     96.5        46.1                    43.4                    744    701    323   39.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     CONTROL AND INSTRUMENTATION PROBLEMS THAT DEVELOPED IN MAY WERE RESPONSI-
                     BLE FOR SOME FGD SYSTEM OUTAGE TIME.

6/80   A          97.1        73.6                    73.1
       SYSTEM     97.1        62.1                    61.7                    720    715    444   52.5

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE MAJORITY OF THE JUNE FGD SYSTEM OUTAGES WERE A RESULT OF EXTERNAL
                     CAUSES (IUCS DISPOSAL SYSTEM, LOW UNIT DEMAND, SERVICE WATER, ETC.).

7/80   A          96.0        85.1        85.9        82.7
       B          99.1        89.1        89.9        86.6
       SYSTEM     97.5        87.1        87.9        84.6                    744    722    630   61.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE FGD SYSTEM EXPERIENCED PROCESS CONTROL PROBLEMS DURING JULY.

                     PROBLEMS WITH LEAKING INLET DAMPER SEALS ALSO OCCURRED DURING JULY.

8/80   A          90.2        65.4        67.3        30.1
       B          97.4        85.5        88.0        39.4
       SYSTEM     93.8        75.5        77.6        34.7                    744    343    259   28.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE UTILITY REPORTED THAT PROBLEMS WERE ENCOUNTERED WITH THE RECLAIM WATER
                     AND THE RECYCLE SLURRY SYSTEMS DURING AUGUST.

9/80   A          93.6        88.2        88.5        87.8
       B          94.2        90.7        91.0        90.3
       SYSTEM     93.9        89.5        89.8        89.0                    720    716    641   72.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE INLET DAMPER SEAL PROBLEM CONTINUED THROUGH AUGUST AND SEPTEMBER.

                     EXTERNAL PROBLEMS WERE EXPERIENCED WITH THE IUCS SYSTEM.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COMMONWEALTH EDISON	
PLANT NAME	POWERTON	
UNIT NUMBER	51	
CITY	PEKIN	
STATE	ILLINOIS	
REGULATORY CLASSIFICATION	E	
PARTICULATE EMISSION LIMITATION - NG/J	43.	(.100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J	774.	(1.800 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW	1700.0	
GROSS UNIT GENERATING CAPACITY - MW	450.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
NET UNIT GENERATING CAPACITY WO/FGD - MW	425.0	
EQUIVALENT SCRUBBED CAPACITY - MW	450.0	
** BOILER DATA		
SUPPLIER	BABCOCK & WILCOX	
TYPE	CYCLONE	
SERVICE LOAD	BASE	
COMMERCIAL SERVICE DATE	0/72	
MAXIMUM BOILER FLUE GAS FLOW - CU.M/S	722.18	(1530370 ACFM)
FLUE GAS TEMPERATURE - C	157.2	(315 F)
STACK HEIGHT - M	137.	(450 FT)
STACK TOP DIAMETER - M	6.4	(21.0 FT)
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	24516.	(10540 BTU/LB)
RANGE HEAT CONTENT - BTU/LB		******
AVERAGE ASH CONTENT - %	9.16	
RANGE ASH CONTENT - %	******	
AVERAGE MOISTURE CONTENT - %	16.34	
RANGE MOISTURE CONTENT - %	******	
AVERAGE SULFUR CONTENT - %	3.53	
RANGE SULFUR CONTENT - %	******	
AVERAGE CHLORIDE CONTENT - %	.20	
RANGE CHLORIDE CONTENT - %	******	
** GENERAL EMISSION CONTROL SYSTEM DATA		
SALEABLE PRODUCT/THROWAWAY PRODUCT	THROWAWAY PRODUCT	
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
DEVELOPMENT LEVEL	FULL SCALE	
NEW/RETROFIT	RETROFIT	
SO2 DESIGN REMOVAL EFFICIENCY - %	75.50	
COMMERCIAL DATE	6/81	
INITIAL START-UP	4/80	
CONSTRUCTION COMPLETION	8/80	
CONSTRUCTION INITIATION	3/77	
CONTRACT AWARDED	2/76	
** FABRIC FILTER		
NUMBER	0	
** ESP		
NUMBER	1	
TYPE	COLD SIDE	
SUPPLIER	RESEARCH-COTTRELL	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	98.7	
FLUE GAS TEMPERATURE - C	157.2	(315 F)
** MECHANICAL COLLECTOR		
NUMBER	0	
** PARTICLE SCRUBBER		
TYPE	NONE	
** ABSORBER		
NUMBER	3	
TYPE	MOBILE PACKED TOWER	
SUPPLIER	AIR CORRECTION DIVISION, UOP	
NUMBER OF STAGES	3	
DIMENSIONS - FT	55 X 30 X 18	

```
EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

COMMONWEALTH EDISON: POWERTON 51 (CONT.)

      SHELL MATERIAL                                     CARBON STEEL
      SHELL LINER MATERIAL                               NEOPRENE RUBBER
      INTERNAL MATERIAL                                  FRP, CARPENTER 20
      BOILER LOAD/ABSORBER - %                             33.0
      GAS FLOW - CU.M/S                                   240.73        ( 510123 ACFM)
      GAS TEMPERATURE - C                                 157.2         (  315 F)
      LIQUID RECIRCULATION RATE - LITER/S                1575.          (25000 GPM)
      L/G RATIO - L/CU.M                                    8.0         ( 60.0 GAL/1000ACF)
      PRESSURE DROP - KPA                                   3.0         (12.0 IN-H2O)
      SUPERFICAL GAS VELOCITY - M/SEC                       3.8         ( 12.5 FT/S)
      PARTICULATE INLET LOAD - NG/J                        43.          (  .100 LB/MMBTU)
      PARTICULATE OUTLET LOAD - NG/J                       43.          (  .100 LB/MMBTU)
      SO2 INLET CONCENTRATION - PPM                      2696
      SO2 OUTLET CONTRATION - PPM                         660
      SO2 DESIGN REMOVAL EFFICIENCY - %                    75.5

 ** CENTRIFUGE
      NUMBER                                               0

 ** FANS
      TYPE                                               CENTRIFUGAL
      SERVICE - WET/DRY                                  DRY

 ** VACUUM FILTER
      NUMBER                                              3
      TYPE                                               ROTARY DRUM
      CONSTRUCTION MATERIAL                              CARBON STEEL
      CAPACITY - M T/D                                    1088.4        ( 1200 T/D)
      OUTLET SOLIDS - %                                     55.0

 ** MIST ELIMINATOR
      NUMBER                                              2
      TYPE                                               CHEVRON
      CONSTRUCTION MATERIAL                              FIBERGLASS REINFORCED PLASTIC
      CONFIGURATION                                      HORIZONTAL
      WASH SYSTEM                                        WASH TOP AND BOTTOM LAYERS ONLY
      SUPERFICIAL GAS VELOCITY - M/S                         2.7        (  9.0 FT/S)

 ** PROCESS CONTROL CHEMISTRY
      CONTROL VARIABLES                                  SO2, GAS FLOW, PH
      CONTROL MANNER                                     AUTOMATIC
      MODE                                               FEEDBACK/FEED FORWARD

 ** TANKS
      SERVICE                                            NUMBER
      -------                                            ------
      RECYCLE                                               3
      SLURRY MAKE-UP                                        1
      M.E. WASH                                             1
      WASTE SLURRY                                          2
      LIMESTONE TRANSFER                                    2
      RECLAIMED WATER                                       1

 ** REHEATER
      TYPE                                               HOT AIR INJECTION
      HEATING MEDIUM                                     STEAM
      TEMPERATURE BOOST - C                                 13.9        (   25 F)
      ENERGY REQUIRED                                    71,000,000 BTU/HR

 ** THICKENER
      NUMBER                                              1
      CONSTRUCTION MATERIAL                              CARBON STEEL
      DIAMETER - M                                         51.8         (170 FT)
      OUTLET SOLIDS - %                                    35.0

 ** WATER LOOP
      TYPE                                               CLOSED
      FRESH MAKEUP WATER ADDITION - LITERS/S               35.3         (  560 GPM)

 ** REAGENT PREPARATION EQUIPMENT
      NUMBER OF BALL MILLS                                  2
      BALL MILL CAPACITY- M T/H                            20.0         ( 22.0 TPH)

 ** TREATMENT
      TYPE                                               POZ-O-TEC
      CONTRACTOR                                         IUCS
```

COMMONWEALTH EDISON: POWERTON 51 (CONT.)

INLET- KG/S	20.6	(2727 LB/MIN)
INLET SOLIDS - %	35.0	
** DISPOSAL		
NATURE	FINAL	
TYPE	LANDFILL	
** DISPOSAL		
NATURE	INTERIM	
TYPE	LINED POND	
LOCATION	ON SITE	
CAPACITY - CU.M	122300	(100.0 ACRE-FT)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL FGD SYSTEM OPERATIONS BEGAN IN APRIL. THE FGD SYSTEM IS CURRENTLY OPERATING ON FLUE GAS GENERATED FROM THE BURNING OF LOW SULFUR WESTERN COAL. ONLY TWO OF THE THREE ABSORBER MODULES HAD BEEN OPERATED AS OF THE END OF JUNE. THE FGD SYSTEM IS NOT EXPECTED TO BE DECLARED COMMERCIAL UNTIL DECEMBER 1980.

THE UTILITY REPORTED THAT CURRENT OPERATING AND MAINTENANCE COST PROJECTIONS INDICATE THAT MANPOWER REQUIREMENTS FOR UNIT 51 WILL DOUBLE AND THAT ON A COST BASIS THE POTENTIAL OPTION OF BURNING LOW SULFUR COAL AS A COMPLIANCE STRATEGY WILL PROVE LESS EXPENSIVE THAN FGD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NO DECISION HAS BEEN MADE TO START COMMERCIAL OPERATIONS. THERE ARE NO FGD OPERATIONS EXCEPT TESTING IN ONE MODULE. PERFORMANCE DATA WILL BE AVAILABLE WHEN THE FGD SYSTEM GOES INTO COMMERCIAL OPERATION.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	COOPERATIVE POWER ASSOCIATION
PLANT NAME	COAL CREEK
UNIT NUMBER	1
CITY	UNDERWOOD
STATE	NORTH DAKOTA
GROSS UNIT GENERATING CAPACITY - MW	545.0
NET UNIT GENERATING CAPACITY W/FGD - MW	495.0
EQUIVALENT SCRUBBED CAPACITY - MW	327.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	LIGNITE
AVERAGE HEAT CONTENT - J/G	14556. (6258 BTU/LB)
AVERAGE ASH CONTENT - %	7.14
AVERAGE MOISTURE CONTENT - %	39.83
AVERAGE SULFUR CONTENT - %	.63
AVERAGE CHLORIDE CONTENT - %	.02
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIME/ALKALINE FLYASH
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	7/79
COMMERCIAL START-UP DATE	8/79
SO2 DESIGN REMOVAL EFFICIENCY - %	54.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0
** WATER LOOP	
TYPE	OPEN
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** TREATMENT	
TYPE	FLYASH STABILIZATION
** DISPOSAL	
TYPE	LINED POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		96.1			744	715	715	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY TWO MODULES AT A TIME WERE TAKEN OFF-LINE FOR INSPECTION AND CLEANING. SOME CRACKED NOZZLES AND PLUGGING PROBLEMS WERE FOUND DURING THE INSPECTION. THE BOILER WAS OPERATED AT A REDUCED LOAD.

SOME OUTAGE TIME DURING THE MONTH WAS CAUSED BY BOILER-RELATED PROBLEMS. A BOILER TRIP WAS CAUSED BY A TURBINE ELECTRICIAL RELAY ON JANUARY 13.

AN HOUR OF OUTAGE TIME RESULTED FROM A LOSS OF POWER TO THE CONTROL SYSTEM AND AN ABNORMAL BOILER DRUM LEVEL WAS ALSO ENCOUNTERED ON JANUARY 16.

A THREE TO FOUR HOUR OUTAGE WAS SCHEDULED ON JANUARY 27 TO MAKE REPAIRS ON FGD SYSTEM EQUIPMENT.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM				99.9			696	695		

** PROBLEMS/SOLUTIONS/COMMENTS

WHILE THE BOILER WAS OUT OF SERVICE DUE TO ID FAN PROBLEMS CAUSED BY ELECTRICAL GROUNDING, TWO MODULES WERE TAKEN OUT OF SERVICE SO CALIBRATIONS COULD BE DONE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM		100.0		96.1			744	715	715	

COOPERATIVE POWER ASSOCIATION: COAL CREEK 1 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

BOILER TRIPS OCCURRED THREE TIMES DURING THE MONTH. ONE TRIP WAS DUE TO THE CUT DOWN OF TRANSMISSION POWER ON MARCH 12.

THE FGD SYSTEM WAS SHUTDOWN WITH THE BOILER FOR FOUR HOURS TO CLEAN THE FILTER ON THE BOILER STATOR COOLING PUMPS.

DURING MARCH STACK EMISSION TESTS WERE UNDERTAKEN. THE SYSTEM OPERATED WITH ONE MODULE DOWN DURING TESTING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	11	96.7	58.3	100.0	21.4						
	12	100.0	81.7	100.0	30.0						
	13	100.0	96.1	100.0	35.3						
	14	100.0	96.9	100.0	35.6						
	SYSTEM	99.2	83.3	100.0	30.6			720	264	220	26.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF LINE FOR APPROXIMATELY 19 DAYS FOR THE ANNUAL UNIT OUTAGE. THE SCRUBBING SYSTEM WAS AVAILABLE DURING THE BOILER OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	11	88.3	68.8	100.0	34.4						
	12	79.3	18.6	100.0	9.3						
	13	91.9	79.6	100.0	39.8						
	14	91.3	35.5	100.0	17.7						
	SYSTEM	87.7	50.6	100.0	25.3			744	372	188	28.2

** PROBLEMS/SOLUTIONS/COMMENTS

THE ANNUAL UNIT OUTAGE WAS COMPLETED IN THE BEGINNING OF THE MONTH. THERE WERE PROBLEMS WITH BOILER STARTUP AFTER THIS OUTAGE CAUSING LOW OPERABILITY OF THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	11	92.9	49.3	100.0	49.2						
	12	98.5	47.6	100.0	47.5						
	13	74.7	42.2	100.0	42.1						
	14	93.5	73.0	100.0	72.8						
	SYSTEM	89.9	53.0	100.0	52.9			720	718	381	58.5

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO MAJOR PROBLEMS REPORTED DURING JUNE. ROUTINE MAINTENANCE AND REPAIRS WERE DONE THROUGHOUT THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	100.0	100.0	100.0	87.1			744	648	648	47.1

** PROBLEMS/SOLUTIONS/COMMENTS

IN JULY, NO PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE MONTHS OF AUGUST AND SEPTEMBER.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                          COOPERATIVE POWER ASSOCIATION
PLANT NAME                                            COAL CREEK
UNIT NUMBER                                           2
CITY                                                  UNDERWOOD
STATE                                                 NORTH DAKOTA
REGULATORY CLASSIFICATION                             B
PARTICULATE EMISSION LIMITATION - NG/J                  43.          (  .100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                         516.          ( 1.200 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                    1100.0
GROSS UNIT GENERATING CAPACITY - MW                    545.0
NET UNIT GENERATING CAPACITY W/FGD - MW                495.0
NET UNIT GENERATING CAPACITY WO/FGD - MW              *******
EQUIVALENT SCRUBBED CAPACITY - MW                      327.0

** BOILER DATA
    SUPPLIER                                          COMBUSTION ENGINEERING
    TYPE                                              PULVERIZED LIGNITE
    SERVICE LOAD                                      BASE
    COMMERCIAL SERVICE DATE                           **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S             *********      (******** ACFM)
    FLUE GAS TEMPERATURE - C                            160.0        ( 320 F)
    STACK HEIGHT - M                                    198.         ( 650 FT)
    STACK TOP DIAMETER - M                                6.7        ( 22.0 FT)

** FUEL DATA
    FUEL TYPE                                         COAL
    FUEL GRADE                                        LIGNITE
    AVERAGE HEAT CONTENT - J/G                         14556.        (  6258 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                       3068-7660
    AVERAGE ASH CONTENT - %                                7.14
    RANGE ASH CONTENT - %                             3.89-15.95
    AVERAGE MOISTURE CONTENT - %                         39.83
    RANGE MOISTURE CONTENT - %                        27.78-52.55
    AVERAGE SULFUR CONTENT - %                             .63
    RANGE SULFUR CONTENT - %                          0.18-1.41
    AVERAGE CHLORIDE CONTENT - %                           .02
    RANGE CHLORIDE CONTENT - %                        0.00-0.08

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT                THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                              WET SCRUBBING
    PROCESS TYPE                                      LIME/ALKALINE FLYASH
    PROCESS ADDITIVES                                 NONE
    SYSTEM SUPPLIER                                   COMBUSTION ENGINEERING
    A-E FIRM                                          BLACK & VEATCH
    DEVELOPMENT LEVEL                                 FULL SCALE
    NEW/RETROFIT                                      NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %            99.50
    SO2 DESIGN REMOVAL EFFICIENCY - %                    54.00
    COMMERCIAL DATE                                    9/80
    INITIAL START-UP                                   7/80
    CONSTRUCTION INITIATION                            8/77

** ESP
    NUMBER                                              1
    TYPE                                              COLD SIDE
    SUPPLIER                                          WHEELABRATOR-FRYE
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %            99.5
    FLUE GAS CAPACITY - CU.M/S                         1090.1        (2310000 ACFM)
    FLUE GAS TEMPERATURE - C                            160.6        (  321 F)
    PARTICULATE OUTLET LOAD - G/CU.M                       .02       (    .01 GR/SCF)

** PARTICLE SCRUBBER
    TYPE                                              NONE

** ABSORBER
    NUMBER                                              4
    TYPE                                              SPRAY TOWER
    INITIAL START UP                                  11/79
    SUPPLIER                                          COMBUSTION ENGINEERING
    NUMBER OF STAGES                                    3
    DIMENSIONS - FT                                   22 X 22 X 20
    SHELL MATERIAL                                    316L SS
    SHELL LINER MATERIAL                              NONE
```

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

NOZZLE TYPE	PROPRIETARY ATOMIZING
L/G RATIO - L/CU.M	8.0 (60.0 GAL/1000ACF)
SO2 INLET CONCENTRATION - PPM	1000
SO2 OUTLET CONTRATION - PPM	100
SO2 DESIGN REMOVAL EFFICIENCY - %	90.0

** FANS

NUMBER	4
TYPE	INDUCED DRAFT

** MIST ELIMINATOR

NUMBER	1
TYPE	CHEVRON
CONSTRUCTION MATERIAL	FIBERGLASS REINFORCED PLASTIC
NUMBER OF STAGES	2

** MIST ELIMINATOR

NUMBER	1
TYPE	SLAT IMPINGEMENT
CONSTRUCTION MATERIAL	FIBERGLASS REINFORCED PLASTIC

** PUMPS

SERVICE	NUMBER
BLEED STREAM	3
SLURRY FEED	****
REACTION TANK	6
******	****

** TANKS

SERVICE	NUMBER
REACTION-RECYCLE-THICKENER	2
FLYASH WETTING	****
LIME FEED	****

** REHEATER

TYPE	BYPASS
TEMPERATURE BOOST - C	47.2 (85 F)

** WATER LOOP

TYPE	OPEN

** REAGENT PREPARATION EQUIPMENT

NUMBER OF SLAKERS	1

** TREATMENT

TYPE	FLYASH STABILIZATION

** DISPOSAL

NATURE	FINAL
TYPE	LINED POND
AREA - ACRES	104.0

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS (7/80)

INITIAL OPERATION OF THE FGD SYSTEM BEGAN IN JULY 1980. NO MAJOR STARTUP PROBLEMS WERE REPORTED.

COOPERATIVE POWER ASSOCIATION: COAL CREEK 2 (CONT.)

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----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------
      ** PROBLEMS/SOLUTIONS/COMMENTS

                      THE FGD SYSTEM IS STILL IN THE INITIAL PHASE OF OPERATION.  NO PERFORMANCE
                      DATA ARE AVAILABLE AT THE PRESENT TIME.
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                                                    SECTION 3
                       DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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   COMPANY NAME
   PLANT NAME                                          DELMARVA POWER & LIGHT
   UNIT NUMBER                                         DELAWARE CITY
   CITY                                                1
   STATE                                               DELAWARE CITY
   REGULATORY CLASSIFICATION                           DELAWARE
   PARTICULATE EMISSION LIMITATION - NG/J              E
   SO2 EMISSION LIMITATION - NG/J                        129.         (  .300 LB/MMBTU)
   NET PLANT GENERATING CAPACITY - MW                  ******         (****** LB/MMBTU)
   GROSS UNIT GENERATING CAPACITY - MW                   180.0
   NET UNIT GENERATING CAPACITY W/FGD - MW                60.0
   NET UNIT GENERATING CAPACITY WO/FGD - MW            *******
   EQUIVALENT SCRUBBED CAPACITY - MW                   *******
                                                          60.0

** BOILER DATA
      SUPPLIER
      TYPE                                             RILEY STOKER
      SERVICE LOAD                                     PULVERIZED COKE
      COMMERCIAL SERVICE DATE                          BASE
      MAXIMUM BOILER FLUE GAS FLOW - CU.M/S            10/56
      FLUE GAS TEMPERATURE - C                           417.63       ( 885000 ACFM)
      STACK HEIGHT - M                                   215.6        ( 420 F)
      STACK TOP DIAMETER - M                             152.         ( 500 FT)
                                                           6.1        ( 20.0 FT)

** FUEL DATA
      FUEL TYPE
      FUEL GRADE                                       COKE
      AVERAGE HEAT CONTENT - J/G                       FLUID PETROLEUM COKE
      RANGE HEAT CONTENT - BTU/LB                       32564.       ( 14000 BTU/LB)
      AVERAGE ASH CONTENT - %                                          13500-14500
      RANGE ASH CONTENT - %                                  .50
      AVERAGE MOISTURE CONTENT - %                     .3-.7
      RANGE MOISTURE CONTENT - %                             .70
      AVERAGE SULFUR CONTENT - %                       .5-1.2
      RANGE SULFUR CONTENT - %                              7.00
      AVERAGE CHLORIDE CONTENT - %                     5-8
      RANGE CHLORIDE CONTENT - %                       ********
                                                       ******

** GENERAL EMISSION CONTROL SYSTEM DATA
      SALEABLE PRODUCT/THROWAWAY PRODUCT
      GENERAL PROCESS TYPE                             SALEABLE PRODUCT
      PROCESS TYPE                                     WET SCRUBBING
      SYSTEM SUPPLIER                                  WELLMAN LORD
      A-E FIRM                                         DAVY MCKEE
      CONSTRUCTION FIRM                                DAVY MCKEE
      DEVELOPMENT LEVEL                                DAVY MCKEE
      NEW/RETROFIT                                     FULL SCALE
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        RETROFIT
      SO2 DESIGN REMOVAL EFFICIENCY - %                   90.00
      COMMERCIAL DATE                                     90.00
      INITIAL START-UP                                  5/80
      CONSTRUCTION COMPLETION                           5/80
      CONSTRUCTION INITIATION                           4/80
      CONTRACT AWARDED                                  1/78
      LETTER OF INTENT SIGNED                           9/77
      STARTED PRELIMINAY DESIGN                         8/76
                                                       10/77

** FABRIC FILTER
      TYPE
                                                       NONE

** ESP
      NUMBER
      SUPPLIER                                          3
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        JOY WESTERN
      FLUE GAS CAPACITY - CU.M/S                          95.0
      FLUE GAS TEMPERATURE - C                           104.3        ( 221000 ACFM)
      PRESSURE DROP - KPA                                 54.4        (  130 F)
      PARTICULATE OUTLET LOAD - G/CU.M                 *******        (***** IN-H2O)
                                                           .69        (    .30 GR/SCF)

** MECHANICAL COLLECTOR
      NUMBER
      TYPE                                              3
      SUPPLIER                                         TUBULAR
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        PRAT-DANIEL
                                                          92.0
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DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

 ** PARTICLE SCRUBBER
      NUMBER                                         3
      TYPE                                          VENTURI
      SUPPLIER                                      AIRPOL
      NUMBER OF STAGES                                  1
      SHELL MATERIAL                                CARBON STEEL
      LINING MATERIAL                               GLASS FLAKE, ACID BRICK, CAROBRAX BRICK
      NUMBER OF NOZZLES                                 1
      TYPE OF NOZZLES                               OPEN PIPE WITH REFRAX TIP
      BOILER LOAD/SCRUBBER - %                        100.0
      FLUE GAS CAPACITY - CU.M/S                      139.2       ( 295000 ACFM)
      FLUE GAS TEMPERATURE - C                        215.6       (   420 F)
      LIQUID RECIRCULATION RATE - LITER/S             315.0       (  5000 GPM)
      PRESSURE DROP - KPA                           *******       (***** IN-H2O)
      PARTICULATE INLET LOAD - G/CU.M                   3.2       (  1.39 GR/SCF)
      PARTICULATE OUTLET LOAD - G/CU.M                   .6       (  .250 GR/SCF)
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        81.5
      SO2 INLET CONCENTRATION - PPM                  3500.000
      SO2 DESIGN REMOVAL EFFICIENCY - %                  .0

 ** ABSORBER
      NUMBER                                         3
      TYPE                                          TRAY TOWER
      INITIAL START UP                               4/80
      SUPPLIER                                      DAVY MCKEE
      NUMBER OF STAGES                                  4
      DIMENSIONS - FT                               20 X 20
      SHELL MATERIAL                                REINFORCED CONCRETE
      SHELL LINER MATERIAL                          TILE
      INTERNAL MATERIAL                             316L SS
      BOILER LOAD/ABSORBER - %                        100.0
      GAS FLOW - CU.M/S                               103.82      ( 220000 ACFM)
      GAS TEMPERATURE - C                              54.4       (   130 F)
      LIQUID RECIRCULATION RATE - LITER/S              25.        (   400 GPM)
      PARTICULATE INLET LOAD - G/CU.M                    .2       (  .100 GR/SCF)
      PARTICULATE OUTLET LOAD- G/CU.M                    .2       (  .100 GR/SCF)
      PARTICULATE REMOVAL EFFICIENCY - %                 .0
      SO2 INLET CONCENTRATION - PPM                  3500
      SO2 OUTLET CONTRATION - PPM                     390

 ** CENTRIFUGE
      TYPE                                          NONE

 ** FANS
      NUMBER                                         3
      CONSTRUCTION MATERIALS                        CARBON STEEL
      SERVICE - WET/DRY                             DRY
      CAPACITY - CU.M/S                               139.21      ( 295000 ACFM)

 ** VACUUM FILTER
      TYPE                                          NONE

 ** MIST ELIMINATOR
      NUMBER                                         3
      TYPE                                          CHEVRON
      CONSTRUCTION MATERIAL                         NORYL PLASTIC
      CONFIGURATION                                 HORIZONTAL
      NUMBER OF STAGES                                  1
      NUMBER OF PASSES                                  1
      FREEBOARD DISTANCE - M                            1.83      (  6.0 FT)
      DEPTH - M                                         2.29      (  7.5 FT)
      WASH SYSTEM                                   INTERMITTANT SPRAYS
      PRESSURE DROP - KPA                                .1       (   .3 IN-H2O)

 ** PROCESS CONTROL CHEMISTRY
      CONTROL VARIABLES                             PH, SOLIDS, SP.G., CONC.
      CONTROL MANNER                                AUTOMATIC
      MODE                                          FEEDBACK
      SENSOR LOCATION                               GAS OUTLET, SOLUTION OUTLET

 ** PUMPS
      SERVICE                                       NUMBER
      -------                                       ------
      ******                                        ****
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DELMARVA POWER & LIGHT: DELAWARE CITY 1 (CONT.)

  ** REHEATER
       NUMBER                                            3
       TYPE                                            HOT AIR INJECTION
       HEATING MEDIUM                                  FLUE GAS
       TEMPERATURE BOOST - C                              27.8        (   50 F)

  ** THICKENER
       TYPE                                            NONE

  ** WATER LOOP
       TYPE                                            CLOSED

  ** BYPRODUCTS
       BYPRODUCT NATURE                                SULFURIC ACID
       BYPRODUCT QUANTITY - M T/H                         11.34       ( 12.50 TPH)
       BYPRODUCT QUALITY - %                              93.0
       DISPOSITION                                     MARKETED

  ** TREATMENT
       TYPE                                            NEUTRALIZATION

  ** DISPOSAL
       NATURE                                          FINAL
       TYPE                                            LINED POND


--------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM     100.0        100.0       100.0        32.3                744   240    240

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS ON MAY 22, 1980.
                           NO MAJOR PROBLEMS WERE ENCOUNTERED FROM STARTUP THROUGH THE END OF
                           THE MONTH.

 6/80  SYSTEM      98.9         98.9        98.9        98.9                720   720    712

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO MAJOR PROBLEMS WERE ENCOUNTERED DURING JUNE.

 7/80  SYSTEM      97.2         97.0        97.0        90.7                744   696    675

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM WAS DOWN FOR PART OF THE MONTH IN JULY TO REPAIR A LEAK IN
                           THE MIST ELIMINATOR.

 8/80  SYSTEM      99.9         99.9        99.9        99.9                744   744    743

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO FGD-RELATED PROBLEMS WERE REPORTED DURING AUGUST.

 9/80  SYSTEM                                                               720

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                        DELMARVA POWER & LIGHT
PLANT NAME                                          DELAWARE CITY
UNIT NUMBER                                         2
CITY                                                DELAWARE CITY
STATE                                               DELAWARE
REGULATORY CLASSIFICATION                           E
PARTICULATE EMISSION LIMITATION - NG/J                129.        (  .300 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                      ******        (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                    180.0
GROSS UNIT GENERATING CAPACITY - MW                    60.0
NET UNIT GENERATING CAPACITY W/FGD - MW             *******
NET UNIT GENERATING CAPACITY WO/FGD - MW            *******
EQUIVALENT SCRUBBED CAPACITY - MW                      60.0

** BOILER DATA
   SUPPLIER                                         RILEY STOKER
   TYPE                                             PULVERIZED COKE
   SERVICE LOAD                                     BASE
   COMMERCIAL SERVICE DATE                          10/56
   MAXIMUM BOILER FLUE GAS FLOW - CU.M/S              417.63      ( 885000 ACFM)
   FLUE GAS TEMPERATURE - C                           215.6       ( 420 F)
   STACK HEIGHT - M                                   152.        ( 500 FT)
   STACK TOP DIAMETER - M                               6.1       ( 20.0 FT)

** FUEL DATA
   FUEL TYPE                                        COKE
   FUEL GRADE                                       FLUID PETROLEUM COKE
   AVERAGE HEAT CONTENT - J/G                        32564.       ( 14000 BTU/LB)
   RANGE HEAT CONTENT - BTU/LB                                     13500-14500
   AVERAGE ASH CONTENT - %                                .50
   RANGE ASH CONTENT - %                            .3-.7
   AVERAGE MOISTURE CONTENT - %                           .70
   RANGE MOISTURE CONTENT - %                       .5-1.2
   AVERAGE SULFUR CONTENT - %                            7.00
   RANGE SULFUR CONTENT - %                         5-8
   AVERAGE CHLORIDE CONTENT - %                     ********
   RANGE CHLORIDE CONTENT - %                       ******

** GENERAL EMISSION CONTROL SYSTEM DATA
   SALEABLE PRODUCT/THROWAWAY PRODUCT               SALEABLE PRODUCT
   GENERAL PROCESS TYPE                             WET SCRUBBING
   PROCESS TYPE                                     WELLMAN LORD
   SYSTEM SUPPLIER                                  DAVY MCKEE
   A-E FIRM                                         DAVY MCKEE
   CONSTRUCTION FIRM                                DAVY MCKEE
   DEVELOPMENT LEVEL                                FULL SCALE
   NEW/RETROFIT                                     RETROFIT
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %          90.00
   SO2 DESIGN REMOVAL EFFICIENCY - %                  90.00
   COMMERCIAL DATE                                  5/80
   INITIAL START-UP                                 5/80
   CONSTRUCTION COMPLETION                          4/80
   CONSTRUCTION INITIATION                          1/78
   CONTRACT AWARDED                                 9/77
   LETTER OF INTENT SIGNED                          8/76
   STARTED PRELIMINAY DESIGN                        10/77

** FABRIC FILTER
   TYPE                                             NONE

** ESP
   NUMBER                                             3
   SUPPLIER                                         JOY WESTERN
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %          95.0
   FLUE GAS CAPACITY - CU.M/S                        104.3        ( 221000 ACFM)
   FLUE GAS TEMPERATURE - C                           54.4        (  130 F)
   PRESSURE DROP - KPA                              ********      (****** IN-H2O)
   PARTICULATE OUTLET LOAD - G/CU.M                     .69       (    .30 GR/SCF)

** MECHANICAL COLLECTOR
   NUMBER                                             3
   TYPE                                             TUBULAR
   SUPPLIER                                         PRAT-DANIEL
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %          92.0
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DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

```
** PARTICLE SCRUBBER
     NUMBER                                          3
     TYPE                                           VENTURI
     SUPPLIER                                       AIRPOL
     NUMBER OF STAGES                                   1
     SHELL MATERIAL                                 CARBON STEEL
     LINING MATERIAL                                GLASS FLAKE, ACID BRICK, CAROBRAX BRICK
     NUMBER OF NOZZLES                                  1
     TYPE OF NOZZLES                                OPEN PIPE WITH REFRAX TIP
     BOILER LOAD/SCRUBBER - %                         100.0
     FLUE GAS CAPACITY - CU.M/S                       139.2          ( 295000 ACFM)
     FLUE GAS TEMPERATURE - C                         215.6          (  420 F)
     LIQUID RECIRCULATION RATE - LITER/S              315.0          ( 5000 GPM)
     PRESSURE DROP - KPA                            *******          (***** IN-H2O)
     PARTICULATE INLET LOAD - G/CU.M                    3.2          (  1.39 GR/SCF)
     PARTICULATE OUTLET LOAD - G/CU.M                    .6          (  .250 GR/SCF)
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %         81.5
     SO2 INLET CONCENTRATION - PPM                   3500.000
     SO2 DESIGN REMOVAL EFFICIENCY - %                   .0

** ABSORBER
     NUMBER                                          3
     TYPE                                           TRAY TOWER
     INITIAL START UP                                4/80
     SUPPLIER                                       DAVY MCKEE
     NUMBER OF STAGES                                   4
     DIMENSIONS - FT                                20 X 20
     SHELL MATERIAL                                 REINFORCED CONCRETE
     SHELL LINER MATERIAL                           TILE
     INTERNAL MATERIAL                              316L SS
     BOILER LOAD/ABSORBER - %                          100.0
     GAS FLOW - CU.M/S                                 103.82         ( 220000 ACFM)
     GAS TEMPERATURE - C                                54.4          (  130 F)
     LIQUID RECIRCULATION RATE - LITER/S                25.           (  400 GPM)
     PARTICULATE INLET LOAD - G/CU.M                      .2          (  .100 GR/SCF)
     PARTICULATE OUTLET LOAD- G/CU.M                      .2          (  .100 GR/SCF)
     PARTICULATE REMOVAL EFFICIENCY - %                   .0
     SO2 INLET CONCENTRATION - PPM                    3500
     SO2 OUTLET CONTRATION - PPM                       390

** CENTRIFUGE
     TYPE                                           NONE

** FANS
     NUMBER                                          3
     CONSTRUCTION MATERIALS                         CARBON STEEL
     SERVICE - WET/DRY                              DRY
     CAPACITY - CU.M/S                                139.21          ( 295000 ACFM)

** VACUUM FILTER
     TYPE                                           NONE

** MIST ELIMINATOR
     NUMBER                                          3
     TYPE                                           CHEVRON
     CONSTRUCTION MATERIAL                          NORYL PLASTIC
     CONFIGURATION                                  HORIZONTAL
     NUMBER OF STAGES                                   1
     NUMBER OF PASSES                                   1
     FREEBOARD DISTANCE - M                             1.83        ( 6.0 FT)
     DEPTH - M                                          2.29        ( 7.5 FT)
     WASH SYSTEM                                    INTERMITTANT SPRAYS
     PRESSURE DROP - KPA                                 .1         (  .3 IN-H2O)

** PROCESS CONTROL CHEMISTRY
     CONTROL VARIABLES                              PH, SOLIDS, SP.G., CONC.
     CONTROL MANNER                                 AUTOMATIC
     MODE                                           FEEDBACK
     SENSOR LOCATION                                GAS OUTLET, SOLUTION OUTLET

** PUMPS
     SERVICE                                        NUMBER
     -------                                        ------
     ******                                         ****
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EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

DELMARVA POWER & LIGHT: DELAWARE CITY 2 (CONT.)

 ** REHEATER
     NUMBER                                          3
     TYPE                                           HOT AIR INJECTION
     HEATING MEDIUM                                 FLUE GAS
     TEMPERATURE BOOST - C                             27.8           (   50 F)

 ** THICKENER
     TYPE
                                                    NONE

 ** WATER LOOP
     TYPE
                                                    CLOSED

 ** BYPRODUCTS
     BYPRODUCT NATURE                               SULFURIC ACID
     BYPRODUCT QUANTITY - M T/H                        11.34          ( 12.50 TPH)
     BYPRODUCT QUALITY - %                             93.0
     DISPOSITION                                    MARKETED

 ** TREATMENT
     TYPE
                                                    NEUTRALIZATION

 ** DISPOSAL
     NATURE
     TYPE                                           FINAL
                                                    LINED POND

-----------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------
 5/80  SYSTEM     100.0       100.0       100.0        32.3                 744   240    240

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS ON MAY 22, 1980.
                         NO MAJOR PROBLEMS WERE ENCOUNTERED DURING STARTUP OR THROUGH THE REST OF
                         THE MONTH.

 6/80  SYSTEM      80.4        80.4        80.4        80.4                 720   720    579

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE CHEVRON PACKING IN THE MIST ELIMINATOR FAILED CAUSING SOME FGD SYSTEM
                         OUTAGE TIME DURING JUNE.

                         FAILURE OF THE CIRCULATION PUMPS ALSO CAUSED OUTAGE TIME DURING THE MONTH.

 7/80  SYSTEM      50.1        50.1        50.1        50.1                 744   744    373

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE FGD SYSTEM WAS DOWN FOR PART OF THE MONTH TO REPAIR A LEAK IN THE MIST
                         ELIMINATOR.  IT WAS ALSO DOWN TO REBUILD THE CHEVRON PACKING.

 8/80  SYSTEM      92.9        92.9        92.9        92.9                 744   744    691

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         REPAIRS WERE MADE TO THE ESP DURING AUGUST.

 9/80  SYSTEM                                                               720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.
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                                   SECTION 3
             DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
-------------------------------------------------------------------------------------------

COMPANY NAME                                       DELMARVA POWER & LIGHT
PLANT NAME                                         DELAWARE CITY
UNIT NUMBER                                        3
CITY                                               DELAWARE CITY
STATE                                              DELAWARE
REGULATORY CLASSIFICATION                          E
PARTICULATE EMISSION LIMITATION - NG/J              129.          ( .300 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                     ******         (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                  180.0
GROSS UNIT GENERATING CAPACITY - MW                  60.0
NET UNIT GENERATING CAPACITY W/FGD - MW            *******
NET UNIT GENERATING CAPACITY WO/FGD - MW           *******
EQUIVALENT SCRUBBED CAPACITY - MW                    60.0

** BOILER DATA
    SUPPLIER                                       RILEY STOKER
    TYPE                                           PULVERIZED COKE
    SERVICE LOAD                                   BASE
    COMMERCIAL SERVICE DATE                        10/56
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S            417.63         ( 885000 ACFM)
    FLUE GAS TEMPERATURE - C                         215.6          ( 420 F)
    STACK HEIGHT - M                                 152.           ( 500 FT)
    STACK TOP DIAMETER - M                             6.1          ( 20.0 FT)

** FUEL DATA
    FUEL TYPE                                      COKE
    FUEL GRADE                                     FLUID PETROLEUM COKE
    AVERAGE HEAT CONTENT - J/G                      32564.          ( 14000 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                       13500-14500
    AVERAGE ASH CONTENT - %                             .50
    RANGE ASH CONTENT - %                          .3-.7
    AVERAGE MOISTURE CONTENT - %                        .70
    RANGE MOISTURE CONTENT - %                     .5-1.2
    AVERAGE SULFUR CONTENT - %                         7.00
    RANGE SULFUR CONTENT - %                       5-8
    AVERAGE CHLORIDE CONTENT - %                   ********
    RANGE CHLORIDE CONTENT - %                     ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT             SALEABLE PRODUCT
    GENERAL PROCESS TYPE                           WET SCRUBBING
    PROCESS TYPE                                   WELLMAN LORD
    SYSTEM SUPPLIER                                DAVY MCKEE
    A-E FIRM                                       DAVY MCKEE
    CONSTRUCTION FIRM                              DAVY MCKEE
    DEVELOPMENT LEVEL                              FULL SCALE
    NEW/RETROFIT                                   RETROFIT
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %         90.00
    SO2 DESIGN REMOVAL EFFICIENCY - %                 90.00
    COMMERCIAL DATE                                 5/80
    INITIAL START-UP                                5/80
    CONSTRUCTION COMPLETION                         4/80
    CONSTRUCTION INITIATION                         1/78
    CONTRACT AWARDED                                9/77
    LETTER OF INTENT SIGNED                         8/76
    STARTED PRELIMINAY DESIGN                      10/77

** FABRIC FILTER
    TYPE                                           NONE

** ESP
    NUMBER                                          3
    SUPPLIER                                       JOY WESTERN
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        95.0
    FLUE GAS CAPACITY - CU.M/S                      104.3          ( 221000 ACFM)
    FLUE GAS TEMPERATURE - C                         54.4          (  130 F)
    PRESSURE DROP - KPA                            *******         (***** IN-H2O)
    PARTICULATE OUTLET LOAD - G/CU.M                   .69         (   .30 GR/SCF)

** MECHANICAL COLLECTOR
    NUMBER                                          3
    TYPE                                           TUBULAR
    SUPPLIER                                       PRAT-DANIEL
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        92.0
```

```
 ** PARTICLE SCRUBBER
      NUMBER                                         3
      TYPE                                          VENTURI
      SUPPLIER                                      AIRPOL
      NUMBER OF STAGES                                 1
      SHELL MATERIAL                                CARBON STEEL
      LINING MATERIAL                               GLASS FLAKE, ACID BRICK, CAROBRAX BRICK
      NUMBER OF NOZZLES                                1
      TYPE OF NOZZLES                               OPEN PIPE WITH REFRAX TIP
      BOILER LOAD/SCRUBBER - %                        100.0
      FLUE GAS CAPACITY - CU.M/S                      139.2        ( 295000 ACFM)
      FLUE GAS TEMPERATURE - C                        215.6        (  420 F)
      LIQUID RECIRCULATION RATE - LITER/S             315.0        ( 5000 GPM)
      PRESSURE DROP - KPA                           *******        (***** IN-H2O)
      PARTICULATE INLET LOAD - G/CU.M                   3.2        (  1.39 GR/SCF)
      PARTICULATE OUTLET LOAD - G/CU.M                   .6        (  .250 GR/SCF)
      PARTICULATE DESIGN REMOVAL EFFICIENCY - %        81.5
      SO2 INLET CONCENTRATION - PPM                  3500.000
      SO2 DESIGN REMOVAL EFFICIENCY - %                  .0

 ** ABSORBER
      NUMBER                                         3
      TYPE                                          TRAY TOWER
      INITIAL START UP                               5/80
      SUPPLIER                                      DAVY MCKEE
      NUMBER OF STAGES                                 4
      DIMENSIONS - FT                               20 X 20
      SHELL MATERIAL                                REINFORCED CONCRETE
      SHELL LINER MATERIAL                          TILE
      INTERNAL MATERIAL                             316L SS
      BOILER LOAD/ABSORBER - %                        100.0
      GAS FLOW - CU.M/S                               103.82       ( 220000 ACFM)
      GAS TEMPERATURE - C                              54.4        (  130 F)
      LIQUID RECIRCULATION RATE - LITER/S              25.         (  400 GPM)
      PARTICULATE INLET LOAD - G/CU.M                    .2        (  .100 GR/SCF)
      PARTICULATE OUTLET LOAD- G/CU.M                    .2        (  .100 GR/SCF)
      PARTICULATE REMOVAL EFFICIENCY - %                 .0
      SO2 INLET CONCENTRATION - PPM                  3500
      SO2 OUTLET CONTRATION - PPM                     390

 ** CENTRIFUGE
      TYPE                                          NONE

 ** FANS
      NUMBER                                         3
      CONSTRUCTION MATERIALS                        CARBON STEEL
      SERVICE - WET/DRY                             DRY
      CAPACITY - CU.M/S                               139.21       ( 295000 ACFM)

 ** VACUUM FILTER
      TYPE                                          NONE

 ** MIST ELIMINATOR
      NUMBER                                         3
      TYPE                                          CHEVRON
      CONSTRUCTION MATERIAL                         NORYL PLASTIC
      CONFIGURATION                                 HORIZONTAL
      NUMBER OF STAGES                                 1
      NUMBER OF PASSES                                 1
      FREEBOARD DISTANCE - M                           1.83        ( 6.0 FT)
      DEPTH - M                                        2.29        ( 7.5 FT)
      WASH SYSTEM                                   INTERMITTANT SPRAYS
      PRESSURE DROP - KPA                               .1         (  .3 IN-H2O)

 ** PROCESS CONTROL CHEMISTRY
      CONTROL VARIABLES                             PH, SOLIDS, SP.G., CONC.
      CONTROL MANNER                                AUTOMATIC
      MODE                                          FEEDBACK
      SENSOR LOCATION                               GAS OUTLET, SOLUTION OUTLET

 ** PUMPS
      SERVICE                                       NUMBER
      -------                                       ------
      ******                                        ****
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DELMARVA POWER & LIGHT: DELAWARE CITY 3 (CONT.)

 ** REHEATER
     NUMBER                                       3
     TYPE                                         HOT AIR INJECTION
     HEATING MEDIUM                               FLUE GAS
     TEMPERATURE BOOST - C                           27.8        (    50 F)

 ** THICKENER
     TYPE                                         NONE

 ** WATER LOOP
     TYPE                                         CLOSED

 ** BYPRODUCTS
     BYPRODUCT NATURE                             SULFURIC ACID
     BYPRODUCT QUANTITY - M T/H                      11.34       ( 12.50 TPH)
     BYPRODUCT QUALITY - %                           93.0
     DISPOSITION                                  MARKETED

 ** TREATMENT
     TYPE                                         NEUTRALIZATION

 ** DISPOSAL
     NATURE                                       FINAL
     TYPE                                         LINED POND


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 5/80  SYSTEM     100.0       100.0       100.0       32.3                   744   240    240

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE FGD SYSTEM BEGAN INITIAL AND COMMERCIAL OPERATIONS ON MAY 22, 1980.
                       NO MAJOR PROBLEMS WERE ENCOUNTERED DURING STARTUP OR THROUGH THE REST OF
                       THE MONTH.

 6/80  SYSTEM      86.4        86.4        86.4       86.4                   720   720    622

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       REPAIRS WERE MADE TO A LEAK AND DAMAGED CHEVRON PACKING IN THE MIST ELIM-
                       INATOR DURING JUNE.

 7/80  SYSTEM      95.3        95.3        95.3       95.3                   744   744    709

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       SOME FGD SYSTEM OUTAGE TIME DURING THE MONTH WAS CAUSED BY LEAKS IN THE
                       MIST ELIMINATOR THAT NEEDED REPAIR.

                       AN ELECTRICAL FAILURE IN THE SHUTDOWN INSTRUMENTATION CAUSED THE FGD SYSTEM
                       TO BE OUT OF SERVICE PART OF THE MONTH.

 8/80  SYSTEM      73.3        73.3        73.3       73.3                   744   744    545

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE FGD SYSTEM WAS OUT OF SERVICE FOR PART OF THE MONTH TO REPAIR THE
                       PRESCRUBBER MIST ELIMINATOR.

 9/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DUQUESNE LIGHT	
PLANT NAME	ELRAMA	
UNIT NUMBER	1-4	
CITY	ELRAMA	
STATE	PENNSYLVANIA	
GROSS UNIT GENERATING CAPACITY - MW	510.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	475.0	
EQUIVALENT SCRUBBED CAPACITY - MW	510.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	26400.	(11350 BTU/LB)
AVERAGE ASH CONTENT - %	21.00	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	2.20	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.5	
INITIAL START-UP DATE	10/75	
COMMERCIAL START-UP DATE	10/75	
SO2 DESIGN REMOVAL EFFICIENCY - %	83.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	25.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	101	100.0	51.6	100.0	48.5						
	201	100.0	90.9	100.0	85.5						
	301	100.0	100.0	96.1	100.0						
	401	88.1	68.6	84.4	64.5						
	501	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	100.0	100.0	98.7			744	700	734	

** PROBLEMS/SOLUTIONS/COMMENTS

THERE WERE NO SCRUBBER-RELATED OUTAGES DURING THE SEPTEMBER THROUGH DECEMBER PERIOD.

A NEW SO2 MONITOR, WHICH WAS INSTALLED IN OCTOBER, HAS PLUGGED ONLY ONCE SINCE INSTALLATION AND HAS REQUIRED ONLY FOUR HOURS OF MAINTENANCE PER WEEK.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	101	95.8	91.2	94.8	75.2						
	201	87.1	100.0	87.1	87.1						
	301	84.6	100.0	84.6	84.6						
	401	86.4	55.0	77.1	45.8						
	501	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	100.0	100.0	98.2			744	613	528	
2/80	101	100.0	85.4	100.0	60.5						
	201	100.0	100.0	100.0	96.6						

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	301	100.0	100.0	100.0	100.0						
	401	100.0	100.0	100.0	70.7						
	501	77.6	56.8	64.0	40.2						
	SYSTEM	100.0	100.0	100.0	92.0			696	493	427	

** PROBLEMS/SOLUTIONS/COMMENTS

THE NEW SO2 MONITOR IS STILL OPERATING WELL AND HAS LOGGED SIX MONTHS OF OPERATION.

THE HIGH AVAILABILITIES ARE DUE TO THE 5TH MODULE BEING A TRUE SPARE. AS OF FEBRUARY 1980 AND ARE STILL OPERATING WITHOUT ANY MAJOR PROBLEMS.

THE TWO RUBBER LINED WORMEN RECYCLE PUMPS HAVE NOW LOGGED 14,000 HOURS

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	101	100.0	100.0	100.0	100.0						
	201	100.0	100.0	100.0	100.0						
	301	73.7	73.7	73.7	73.7						
	401	100.0	48.4	100.0	48.4						
	501	78.1	78.1	78.1	78.1						
	SYSTEM	100.0	100.0	100.0	100.0			744	744	595	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH OF MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	101	40.3	38.1	40.0	40.0						
	201	72.3	72.3	72.3	72.3						
	301	87.3	67.3	67.3	87.3						
	401	100.0	100.0	100.0	100.0						
	501	100.0	100.0	100.0	100.0						
	SYSTEM	99.4	99.4	100.0	99.4			720	720	572	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE 101 AND 201 RECYCLE PUMP IMPELLERS HAD TO BE REPLACED. THIS CAUSED 8 HOURS OF OUTAGE TIME FOR THESE TWO MODULES. NO OTHER FGD SYSTEM OUTAGES OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	101	100.0	100.0	100.0	100.0						
	201	40.1	37.1	38.2	37.1						
	301	94.1	89.0	93.8	89.0						
	401	90.3	71.2	88.0	71.2						
	501	96.8	96.8	96.8	96.8						
	SYSTEM	100.0	98.5	100.0	98.5			744	744	586	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE FGD SYSTEM WAS AVAILABLE FOR OPERATION THE ENTIRE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	101	100.0	100.0	100.0	100.0						
	201	100.0	97.8	100.0	97.8						
	301	100.0	96.7	100.0	96.7						
	401	.0	.0	.0	.0						
	501	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	98.6	99.7	98.6			720	720	710	61.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE MODULE 401 WAS CLEANED AND THE CEILCOTE LINER WAS REPLACED. THIS IS THE FIRST TIME SINCE START UP (APPROXIMATELY 17,000 OPERATING HOURS) THAT ANY MODULE NEEDED RELINED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	101	100.0	64.9	100.0	64.9						
	201	100.0	91.1	100.0	91.1						
	301	98.5	85.6	98.5	85.6						
	401	75.8	75.8	75.8	75.8						
	501	35.5	12.9	16.7	12.9						
	SYSTEM	100.0	82.6	97.7	82.6			744	744	615	66.0

DUQUESNE LIGHT: ELRAMA 1-4 (CONT.)

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE RELINING OF MODULE 401 CONTINUED INTO PART OF JULY.

 8/80  101          30.9        21.2         23.5       21.2
       201         100.0        94.8        100.0       94.8
       301         100.0        93.3        100.0       93.3
       401          99.1        99.1         99.1       99.1
       501          83.9        82.5         83.7       82.5
       SYSTEM      100.0        97.7        100.0       97.7                   744   744    727  65.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE RELINING WITH CEILCOTE ON MODULE 501 COMMENCED IN JULY AND CONTINUED
                         FOR APPROXIMATELY 120 HOURS IN AUGUST.

                         THE RELINING OF MODULE 101 WITH CEILCOTE STARTED IN AUGUST ACCOUNTING
                         FOR THE LOW AVAILABILITY DURING THE MONTH.

 9/80  SYSTEM                                                                  720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         INFORMATION FOR THE MONTH OF SEPTEMBER IS NOT AVAILABLE AT THIS TIME.
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SECTION 3

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	DUQUESNE LIGHT	
PLANT NAME	PHILLIPS	
UNIT NUMBER	1-6	
CITY	SOUTH HEIGHT	
STATE	PENNSYLVANIA	
GROSS UNIT GENERATING CAPACITY - MW	408.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	373.0	
EQUIVALENT SCRUBBED CAPACITY - MW	408.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26830.	(11535 BTU/LB)
AVERAGE ASH CONTENT - %	16.27	
AVERAGE MOISTURE CONTENT - %	5.02	
AVERAGE SULFUR CONTENT - %	1.92	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.4	
INITIAL START-UP DATE	7/73	
COMMERCIAL START-UP DATE	6/74	
SO2 DESIGN REMOVAL EFFICIENCY - %	83.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	101	.0	.0	.0	.0						
	201	100.0	98.6	100.0	98.6						
	301	90.7	89.6	97.6	89.6						
	401	77.7	72.9	76.6	72.9						
	SYSTEM	67.1	65.3	66.8	65.3			744	744	486	

** PROBLEMS/SOLUTIONS/COMMENTS

PRESENTLY THE UTILITY HAS BEEN ADDING SODIUM THIOSULFATE TO THE LIME TO PREVENT SCALE FORMATION. THIS PROCESS HAS IMPROVED SO2 COLLECTION AS WELL.

THE SCRUBBER FAN HOUSING LINERS ARE BEING REPLACED.

THE MECHANICAL COLLECTORS ARE BEING UPGRADED TO IMPROVE THE QUALITY OF THE WET SLUDGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	101	.0	.0	.0	.0						
	201	98.1	93.3	98.0	93.3						
	301	100.0	99.0	100.0	99.0						
	401	97.6	95.8	97.5	95.8						
	SYSTEM	73.9	72.0	73.9	72.0			744	744	536	
2/80	101	13.7	13.7	13.7	13.7						
	201	91.6	91.6	91.7	91.6						

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	301	86.2	84.6	86.0	84.6						
	401	94.2	90.5	94.0	90.5						
	SYSTEM	71.4	70.1	71.4	70.1			696	696	488	

** PROBLEMS/SOLUTIONS/COMMENTS

SODIUM THIOSULFATE ADDITION CONTINUED THROUGH THE FIRST QUARTER RESULTING IN A INCIDENCE OF SIGNIFICANTLY REDUCED MIST ELIMINATOR SCALING. 2000-5000 HOURS OF OPERATION HAVE BEEN LOGGED WITHOUT MIST ELIMINATOR SCALE ACCUMULATION. THE UTILITY REPORTED THAT SO2 REMOVAL EFFICIENCY HAS IMPROVED 3% DUE TO THE SODIUM THIOSULFATE ADDITION. THE UTILITY IS LOOKING INTO SODIUM THIOSULFATE ADDITION AT ELRAMA.

THE FAN RUBBER LINERS HAVE BEEN A CONTINUAL PROBLEM. TWO FANS WILL BE REPLACED WITH INCONEL THE NEXT TIME THE RUBBER LINERS FAIL.

THE PHILLIPS FGD SYSTEM HAD A SYSTEM AVAILABILITY OF 71.8% FOR THE YEAR 1979.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	101	94.7	84.0	94.0	84.0						
	201	59.0	53.9	56.8	53.9						
	301	45.4	40.3	43.8	40.3						
	401	95.4	95.3	99.8	95.3						
	SYSTEM	60.3	54.7	73.6	54.7			744	744	407	

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WERE ENCOUNTERED WITH THE MODULE 101 ID FAN. THE MODULE WAS TAKEN OFF LINE SO THE ID FAN COULD BE BALANCED.

PROBLEMS WERE ENCOUNTERED WITH THE HUB BOLTS ON THE ID FAN OF MODULE 201, CAUSING THE MODULE TO COME OFF LINE FOR 11 DAYS.

THE RUBBER LINING ON THE ID FAN HOUSING OF MODULE 301 NEEDED REPAIR DURING MARCH.

MODULE 401 WAS TAKEN OFF LINE FOR APPROXIMATELY 2 HOURS SO REPAIRS COULD BE MADE ON THE SCRUBBER MAKE-UP VALVES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	101	92.6	89.4	92.4	89.4						
	201	14.2	10.0	10.5	10.0						
	301	99.2	99.0	99.8	99.0						
	401	95.8	94.6	98.6	94.6						
	SYSTEM	96.9	73.3	75.6	73.3			720	720	527	

** PROBLEMS/SOLUTIONS/COMMENTS

ON APRIL 5 MODULE 101 WAS TAKEN OFF LINE DUE TO ID FAN BEARING PROBLEMS. LATER IN THE MONTH THE MODULE WAS SHUTDOWN DUE TO AN ID FAN INSTRUMENTATION PRESSURE SWITCH PROBLEM.

TOWARDS THE LATTER PART OF APRIL, MODULE 201 WAS SHUTDOWN DUE TO ID FAN BEARING PROBLEMS. THIS PROBLEM WAS CORRECTED BY BALANCING THE FAN.

MODULE 301 WAS REMOVED FROM OPERATION ON APRIL 11 DUE TO AN ID FAN MOTOR MALFUNCTION.

THE RECYCLE PUMP PACKING ON MODULE 401 NEEDED TO BE REPLACED DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	101	67.5	53.9	62.3	53.9						
	201	81.6	69.0	78.9	69.0						
	301	91.7	73.1	89.5	73.1						
	401	92.2	75.9	90.6	75.9						
	SYSTEM	83.2	68.0	80.2	68.0			744	744	506	

DUQUESNE LIGHT: PHILLIPS 1-6 (CONT.)

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-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

      ** PROBLEMS/SOLUTIONS/COMMENTS

                             MODULE 101 CAME OFF LINE IN MAY SO REPAIRS COULD BE MADE ON THE CONTROL
                             DAMPER AND TO INSTRUMENTATION.

                             DURING MAY MODULE 201 EXPERIENCED PROBLEMS WITH THE MIST ELIMINATOR AND
                             THE ID FAN.  THE MODULE WAS TAKEN OFF LINE FOR APPROXIMATELY TWO DAYS TO
                             WASH THE MISTELIMINATOR INTERNALS AND ONE DAY TO REPAIR THE ID FAN BEARING.

                             MODULE 301 EXPERIENCED ID FAN PROBLEMS AND WAS TAKEN OFF LINE WHILE THE
                             ID FAN WAS BALANCED.

                             MODULE 401 WAS SHUTDOWN APPROXIMATELY 58 HOURS SO THAT THE ID FAN CONTROL
                             DAMPERS COULD BE INSPECTED.

 6/80  101          97.1         80.5        96.5         80.5
       201         100.0         76.2       100.0         76.2
       301          75.5         64.8        72.6         64.8
       401         100.0         71.4       100.0         71.4
       SYSTEM       93.2         73.2        91.5         73.2                   720   720    527  55.3

      ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE MODULE 101 MIST ELIMINATOR WAS CLEANED DURING JUNE.

 7/80  101          94.0         86.2        93.5         86.2
       201         100.0         94.7       100.0         94.7
       301          94.7         84.1        94.0         84.1
       401          91.1         83.5        90.3         83.5
       SYSTEM       94.9         87.1        94.5         87.1                   744   744    648  71.4

      ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING JULY THE RECYCLE PUMP IMPELLERS WERE REPLACED ON ALL THE MODULES
                             EXCEPT FOR MODULE 201.

 8/80  101          91.1         72.9        90.6         72.9
       201          96.9         85.8        96.5         85.8
       301          87.6         85.3        89.6         85.3
       401          92.3         86.1        91.8         86.1
       SYSTEM       92.0         82.5        91.5         82.5                   744   744    614  58.5

      ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING AUGUST MODULE 401 EXPERIENCED PACKING PROBLEMS WITH THE RECYCLE
                             PUMP.

                             DURING THE PERIOD OF JUNE THROUGH AUGUST THE RUBBER LININGS ON THE FAN
                             HOUSINGS WERE REPAIRED.

 9/80  SYSTEM                                                                    720

      ** PROBLEMS/SOLUTIONS/COMMENTS

                             INFORMATION FOR THE MONTH OF SEPTEMBER IS NOT AVAILABLE AT THIS TIME.
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COMPANY NAME
PLANT NAME                                            INDIANAPOLIS POWER & LIGHT
UNIT NUMBER                                           PETERSBURG
CITY                                                  3
STATE                                                 PETERSBURG
GROSS UNIT GENERATING CAPACITY - MW                   INDIANA
NET UNIT GENERATING CAPACITY W/FGD - MW                 532.0
EQUIVALENT SCRUBBED CAPACITY - MW                       515.0
                                                        532.0
** FUEL DATA
    FUEL TYPE
    FUEL GRADE                                        COAL
    AVERAGE HEAT CONTENT - J/G                        BITUMINOUS
    AVERAGE ASH CONTENT - %                            25004.        ( 10750 BTU/LB)
    AVERAGE MOISTURE CONTENT - %                      ********
    AVERAGE SULFUR CONTENT - %                        ********
    AVERAGE CHLORIDE CONTENT - %                          3.25
                                                      ********
** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE
    PROCESS TYPE                                      WET SCRUBBING
    SYSTEM SUPPLIER                                   LIMESTONE
    NEW/RETROFIT                                      AIR CORRECTION DIVISION, UOP
    ENERGY CONSUMPTION - %                            NEW
    INITIAL START-UP DATE                                 2.4
    COMMERCIAL START-UP DATE                          12/77
    SO2 DESIGN REMOVAL EFFICIENCY - %                 12/77
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %            85.00
    ABSORBER SPARE CAPACITY INDEX - %                    99.30
    ABSORBER SPARE COMPONENTS INDEX                        .0
                                                           .0
** WATER LOOP
    TYPE
    FRESH MAKE-UP WATER - LITER/S                     CLOSED
                                                        55.6         ( 882 GPM)
** TREATMENT
    TYPE
                                                      POZ-O-TEC
** DISPOSAL
    TYPE
                                                      LANDFILL

---------------------------------------PERFORMANCE DATA----------------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS  FACTOR
                                                                ----- ----- ----- ------ -----  ------
 1/80  SYSTEM
                                                                             744
 2/80  SYSTEM
                                                                             696
 3/80  SYSTEM
                                                                             744
      ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING THE FIRST QUARTER OF 1980, THE ENTIRE SCRUBBER PACKING BED WAS LOST
                         DUE TO EXCESSIVE WEAR OF THE NEOPRENE FOAM PACKING BALLS.  THE UNIT
                         WILL BE TAKEN OFF LINE IN APRIL TO ACCOMODATE NECESSARY REPAIRS AND
                         REPLACEMENT OF THE BALLS.

                         BYPASS DAMPER FAILURES ALSO OCCURRED AND ARE REPORTED TO BE A CONTINUAL
                         PROBLEM.  MODIFICATIONS WERE MADE TO THE GULLOTINE TYPE DAMPERS DURING
                         THE PERIOD.

 4/80  SYSTEM
                                                                             720
 5/80  SYSTEM
                                                                             744
 6/80  SYSTEM
                                                                             720
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INDIANAPOLIS POWER & LIGHT: PETERSBURG 3 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE PERIOD APRIL 1980 THROUGH JUNE 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE OPERATIONAL DATA FOR THE THIRD QUARTER 1980 WERE NOT AVAILABLE FOR PUBLICATION.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS CITY POWER & LIGHT
PLANT NAME	HAWTHORN
UNIT NUMBER	3
CITY	KANSAS CITY
STATE	MISSOURI
GROSS UNIT GENERATING CAPACITY - MW	90.0
NET UNIT GENERATING CAPACITY W/FGD - MW	85.0
EQUIVALENT SCRUBBED CAPACITY - MW	90.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	22795. (9800 BTU/LB)
AVERAGE ASH CONTENT - %	11.00
AVERAGE MOISTURE CONTENT - %	********
AVERAGE SULFUR CONTENT - %	.60
AVERAGE CHLORIDE CONTENT - %	********
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	2.2
INITIAL START-UP DATE	11/72
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	70.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** TREATMENT	
TYPE	FLYASH STABILIZATION
** DISPOSAL	
TYPE	POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM		100.0		91.0			744	677	677	
11/79	SYSTEM		100.0		38.1			720	274	274	
12/79	SYSTEM		100.0		91.9			744	684	684	
1/80	SYSTEM		100.0		93.0			744	692	692	
2/80	SYSTEM		100.0		100.0			696	696	696	
3/80	SYSTEM		100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME THE BOILER OPERATED. NO PROBLEMS WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM				68.0			720		490	
5/80	SYSTEM				60.0			744		446	
6/80	SYSTEM				66.0			720		475	

KANSAS CITY POWER & LIGHT: HAWTHORN 3 (CONT.)

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----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2   PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE UNIT 3 BOILER EXPERIENCED SUPERHEATER AND ECONOMIZER LEAKS DURING THE
                              APRIL-JUNE PERIOD ACCOUNTING FOR THE LOW SCRUBBER UTILIZATION FIGURES.

7/80   SYSTEM    100.0                             65.0                          744   484   484  45.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE OUTAGE TIME DURING JULY WAS CAUSED BY BOILER TUBE LEAKS.  NO FGD-
                              RELATED PROBLEMS WERE ENCOUNTERED.

8/80   SYSTEM
                                                                                 744   642        49.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE UTILITY REPORTED THAT THE FGD SYSTEM IS NOW CERTIFIED, THEREFORE THE
                              SCRUBBER OPERATING HOURS ARE NO LONGER RECORDED.

                              THE FGD SYSTEM WAS SHUT DOWN FOR 10 HOURS DURING AUGUST TO REPAIR REHEATER
                              TUBE LEAKS.

9/80   SYSTEM
                                                                                 720   248        13.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING SEPTEMBER BOILER OPERATION WAS LIMITED DUE TO A SCHEDULED OVERHAUL.

                              DURING THE MONTH 67 HOURS OF SCRUBBER OUTAGE TIME WERE DUE TO REQUIRED
                              CLEANING OF THE SCRUBBER MODULES.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS CITY POWER & LIGHT	
PLANT NAME	HAWTHORN	
UNIT NUMBER	4	
CITY	KANSAS CITY	
STATE	MISSOURI	
GROSS UNIT GENERATING CAPACITY - MW	90.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	85.0	
EQUIVALENT SCRUBBED CAPACITY - MW	90.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22795.	(9800 BTU/LB)
AVERAGE ASH CONTENT - %	11.00	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	.60	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	2.2	
INITIAL START-UP DATE	8/72	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	70.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM		100.0		91.0			744	677	677	
11/79	SYSTEM		100.0		38.1			720	274	274	
12/79	SYSTEM		100.0		91.9			744	684	684	
1/80	SYSTEM				.0			744	0	0	.0
2/80	SYSTEM				.0			696	0	0	.0
3/80	SYSTEM				.0			744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OFF LINE THROUGH THE FIRST QUARTER OF 1980 BECAUSE OF A TURBINE GENERATOR OVERHAUL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM				65.0			720		468	

** PROBLEMS/SOLUTIONS/COMMENTS

LOW APRIL SCRUBBER UTILIZATION FIGURES OCCURRED BECAUSE THE BOILER WAS OUT OF SERVICE FOR SCHEDULED MAINTENANCE DURING PART OF THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM				90.1			744		670	
6/80	SYSTEM				98.1			720		706	

KANSAS CITY POWER & LIGHT: HAWTHORN 4 (CONT.)

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE UTILITY REPORTED THAT NO UNUSUAL FGD SYSTEM PROBLEMS OCCURRED DURING
                                  MAY AND JUNE.

 7/80  SYSTEM              100.0                    78.0                     744   580    580  55.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  NECESSARY REPAIRS TO THE GENERATOR COLLECTOR RING CAUSED SYSTEM OUTAGE
                                  TIME DURING JULY.

                                  A 53 HOUR OUTAGE WAS DUE TO THE REPLACING OF THE UNDER BED SPRAY HEADERS
                                  ON THE 4A MODULE.  THIS WAS THE ONLY FGD-RELATED PROBLEM DURING JULY.

 8/80  SYSTEM                                                                744   569          47.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE UTILITY REPORTED THAT THE FGD SYSTEM IS NOW CERTIFIED, THEREFORE THE
                                  SCRUBBER OPERATING HOURS ARE NO LONGER RECORDED.

                                  DURING AUGUST APPROXIMATELY 66 HOURS WERE NECESSARY TO PERFORM GENERAL
                                  MAINTENANCE ON THE SYSTEM.

 9/80  SYSTEM                                                                720   111           9.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  LOW BOILER UTILIZATION DURING SEPTEMBER WAS DUE TO A LACK OF DEMAND.

                                  NO FGD SYSTEM PROBLEMS WERE REPORTED FOR THE MONTH OF SEPTEMBER.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS CITY POWER & LIGHT
PLANT NAME	LA CYGNE
UNIT NUMBER	1
CITY	LA CYGNE
STATE	KANSAS
GROSS UNIT GENERATING CAPACITY - MW	820.0
NET UNIT GENERATING CAPACITY W/FGD - MW	820.0
EQUIVALENT SCRUBBED CAPACITY - MW	820.0

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	21913.	(9421 BTU/LB)
AVERAGE ASH CONTENT - %	24.36	
AVERAGE MOISTURE CONTENT - %	8.60	
AVERAGE SULFUR CONTENT - %	5.39	
AVERAGE CHLORIDE CONTENT - %	.03	

** GENERAL EMISSION CONTROL SYSTEM DATA

GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	BABCOCK & WILCOX
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	2.9
INITIAL START-UP DATE	2/73
COMMERCIAL START-UP DATE	6/73
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0

** WATER LOOP

TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	72.3	(1148 GPM)

** DISPOSAL

TYPE	UNLINED POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	SYSTEM	.0			.0			744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WENT DOWN FOR AN OVERHAUL ON OCTOBER 19 AND WAS OUT OF SERVICE THROUGH DECEMBER.

EXTENSIVE MAINTENANCE WORK BEGAN ON THE FGD SYSTEM LATE IN OCTOBER CAUSING THE SYSTEM TO BE UNAVAILABLE DURING NOVEMBER AND DECEMBER. SOME ITEMS INCLUDED IN THE MAINTENANCE WERE:

THE INSTALLATION OF TWO NEW SPRAY HEADERS IN SIX OF THE MODULES, REPLACEMENT OF THE ABSORBER SIDEWALLS, REPLACEMENT OF THE MODULE OUTLET DUCTS AND DAMPERS, AND VARIOUS DUCTWORK PATCHING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	.0			.0			744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM REMAINED UNAVAILABLE DURING JANUARY DUE TO THE ON-GOING GENERATOR/TURBINE OVERHAUL AND THE EXTENSIVE FGD SYSTEM MODIFICATIONS BEING PERFORMED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	98.2	84.1	95.7	20.0						
	B	98.2	58.3	92.9	13.2						
	C	97.4	66.2	89.7	14.9						
	D	99.1	45.9	92.3	10.3						
	E	98.2	93.0	97.3	21.0						
	F	99.1	91.7	97.3	20.7						

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
	G	99.1	91.7	97.3	20.7						
	H	99.6	92.4	97.3	20.8						
	SYSTEM	98.6	77.7	95.3	17.5			696	157	122	10.9

** PROBLEMS/SOLUTIONS/COMMENTS

THE TURBINE/GENERATOR OVERHAUL WAS COMPLETED IN FEBRUARY AND THE BOILER AND FGD SYSTEM RETURNED TO SERVICE ON FEBRUARY 20. THE FGD SYSTEM WAS AVAILABLE FOR OPERATION MOST OF THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	94.6	100.0	100.0	4.3						
	B	96.2	100.0	100.0	4.3						
	C	96.1	100.0	100.0	4.3						
	D	96.1	100.0	100.0	4.3						
	E	95.8	93.8	100.0	4.0						
	F	94.7	53.1	100.0	2.3						
	G	93.3	31.3	100.0	1.3						
	H	95.7	.0		.0						
	SYSTEM	95.3	72.3	100.0	3.1			744	32	23	1.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OPERATED FOR ONLY 23 HOURS IN MARCH AS A RESULT OF GENERATOR/TURBINE PROBLEMS. SOME ROUTINE CLEANING AND INSPECTIONS OF THE FGD SYSTEM WERE PERFORMED DURING THE OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	96.3	94.1	94.5	61.7						
	B	95.1	78.4	91.4	51.4						
	C	95.0	97.5	92.9	63.9						
	D	96.7	93.6	94.8	61.4						
	E	95.3	86.0	92.3	56.4						
	F	92.5	76.3	87.2	50.0						
	G	97.0	68.4	93.9	44.9						
	H	97.0	62.9	93.4	41.3						
	SYSTEM	95.6	82.2	92.6	53.9			720	472	388	37.6
5/80	A	96.4	89.4	96.0	84.1						
	B	94.6	87.9	93.9	82.7						
	C	95.7	88.3	95.2	83.1						
	D	95.9	83.9	95.1	78.9						
	E	96.1	84.4	95.3	79.4						
	F	96.5	89.3	96.2	84.0						
	G	96.1	96.0	94.0	90.3						
	H	96.8	82.3	96.2	77.4						
	SYSTEM	96.0	87.7	95.5	82.5			744	700	614	49.9
6/80	A	98.2	89.5	97.2	46.0						
	B	98.1	90.3	96.8	46.4						
	C	97.4	96.8	96.7	49.7						
	D	98.1	92.5	98.0	47.5						
	E	98.1	87.6	97.9	45.0						
	F	98.3	91.1	98.5	46.8						
	G	98.8	88.2	97.3	45.3						
	H	99.3	87.3	98.6	44.9						
	SYSTEM	98.3	90.4	98.9	46.4			720	370	334	35.5

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD RELATED PROBLEMS WERE REPORTED FOR THE SECOND QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	89.7	86.9	87.1	69.9						
	B	97.8	97.6	97.3	78.5						
	C	97.3	96.9	96.6	77.9						
	D	98.1	98.0	97.7	78.8						
	E	98.2	97.6	97.8	78.4						
	F	98.6	98.6	98.3	79.3						
	G	98.1	97.9	97.6	78.7						
	H	97.7	96.9	97.1	77.9						
	SYSTEM	96.9	96.3	96.2	77.4			744	598	576	60.9

KANSAS CITY POWER & LIGHT: LA CYGNE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	94.6	92.7	93.9	66.9						
	B	97.9	97.3	97.2	70.3						
	C	98.1	97.3	97.3	70.3						
	D	97.7	96.8	97.4	69.9						
	E	97.2	96.2	96.7	69.5						
	F	98.7	97.2	98.1	70.2						
	G	97.6	96.9	96.7	69.9						
	H	97.3	96.4	96.3	69.6						
	SYSTEM	97.4	96.4	96.7	69.6			744	537	518	54.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	98.9	90.4	98.0	53.9						
	B	98.6	91.1	97.5	54.3						
	C	97.8	90.7	96.0	54.0						
	D	94.9	84.8	90.8	50.6						
	E	98.6	91.1	97.5	54.3						
	F	99.2	93.0	98.5	55.4						
	G	99.2	93.0	98.5	55.4						
	H	98.8	90.2	97.7	53.8						
	SYSTEM	98.2	90.7	97.0	54.0			720	429	389	43.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS TAKEN OFF LINE SEVERAL TIMES FOR A TOTAL OF 118 HOURS BECAUSE OF BOILER TUBE LEAKS.

THE BOILER WENT DOWN ON SEPTEMBER 27, 1980 FOR A SCHEDULED MAINTENANCE OVERHAUL. THE FGD SYSTEM WAS AVAILABLE DURING THIS TIME.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	JEFFREY	
UNIT NUMBER	1	
CITY	WAMEGO	
STATE	KANSAS	
GROSS UNIT GENERATING CAPACITY - MW	720.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	680.0	
EQUIVALENT SCRUBBED CAPACITY - MW	540.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	18899.	(8125 BTU/LB)
AVERAGE ASH CONTENT - %	5.80	
AVERAGE MOISTURE CONTENT - %	28.00	
AVERAGE SULFUR CONTENT - %	.32	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	35.1	(557 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM	100.0	100.0	100.0	67.7			744	504	504	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WENT OFF LINE FOR TEN DAYS IN MARCH FOR A SCHEDULED INSPECTION. DURING THE BOILER OUTAGE GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM. OTHER THAN THIS OUTAGE, THE FGD UNIT OPERATED 100% OF THE TIME IN MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE APRIL THROUGH JUNE PERIOD THE FGD SYSTEM OPERATED 100% OF THE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	100.0	100.0	100.0	69.1			744	514	514	49.3

KANSAS POWER & LIGHT: JEFFREY 1 (CONT.)

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-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------
       ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING JULY A 230 HOUR OUTAGE OCCURRED DUE TO A REHEATER TUBE LEAK IN
                              THE BOILER.  NO FGD-RELATED PROBLEMS OCCURRED DURING THE MONTH.
8/80   SYSTEM      100.0        100.0       100.0        84.8                    744   631    631  42.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE FGD SYSTEM WAS TAKEN OUT OF SERVICE FOR PART OF AUGUST SO REPAIRS
                              COULD BE CONDUCTED ON A BOILER REHEAT TUBE.
9/80   SYSTEM      100.0        100.0       100.0       100.0                    720   720    720  67.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              NO PROBLEMS WITH THE BOILER OR THE FGD SYSTEM WERE ENCOUNTERED DURING
                              SEPTEMBER.
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SECTION 3

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                        KANSAS POWER & LIGHT
PLANT NAME                                          JEFFREY
UNIT NUMBER                                         2
CITY                                                WAMEGO
STATE                                               KANSAS
REGULATORY CLASSIFICATION                           D
PARTICULATE EMISSION LIMITATION - NG/J              ******         (****** LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                      ******         (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                  *******
GROSS UNIT GENERATING CAPACITY - MW                   700.0
NET UNIT GENERATING CAPACITY W/FGD - MW               680.0
NET UNIT GENERATING CAPACITY WO/FGD - MW             *******
EQUIVALENT SCRUBBED CAPACITY - MW                     490.0

** BOILER DATA
    SUPPLIER                                        COMBUSTION ENGINEERING
    TYPE                                            PULVERIZED COAL
    SERVICE LOAD                                    BASE
    COMMERCIAL SERVICE DATE                          6/80
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S           ********       (******* ACFM)
    FLUE GAS TEMPERATURE - C                        *******        (**** F)
    STACK HEIGHT - M                                 183.          ( 600 FT)
    STACK TOP DIAMETER - M                          *******        (***** FT)

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      ******
    AVERAGE HEAT CONTENT - J/G                       18841.        (  8100 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                      ******
    AVERAGE ASH CONTENT - %                              5.80
    RANGE ASH CONTENT - %                           7-8
    AVERAGE MOISTURE CONTENT - %                        28.00
    RANGE MOISTURE CONTENT - %                      ******
    AVERAGE SULFUR CONTENT - %                           .30
    RANGE SULFUR CONTENT - %                        ******
    AVERAGE CHLORIDE CONTENT - %                    ********
    RANGE CHLORIDE CONTENT - %                      ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT              THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    LIMESTONE
    SYSTEM SUPPLIER                                 COMBUSTION ENGINEERING
    A-E FIRM                                        BLACK & VEATCH
    DEVELOPMENT LEVEL                               FULL SCALE
    NEW/RETROFIT                                    NEW
    SO2 DESIGN REMOVAL EFFICIENCY - %                 60.00
    COMMERCIAL DATE                                  7/80
    INITIAL START-UP                                 4/80
    CONTRACT AWARDED                                 7/73

** ESP
    NUMBER                                           2
    TYPE                                            COLD SIDE
    SUPPLIER                                        COMBUSTION ENGINEERING
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %         98.6
    FLUE GAS CAPACITY - CU.M/S                       1327.9        (2814000 ACFM)
    FLUE GAS TEMPERATURE - C                          139.4        (  283 F)
    PARTICULATE OUTLET LOAD - G/CU.M                     .07       (    .03 GR/SCF)

** PARTICLE SCRUBBER
    TYPE                                            NONE

** ABSORBER
    TYPE                                            SPRAY TOWER
    INITIAL START UP                                 6/80
    SUPPLIER                                        COMBUSTION ENGINEERING
    BOILER LOAD/ABSORBER - %                           11.7
    L/G RATIO - L/CU.M                                  4.1        ( 30.4 GAL/1000ACF)
    SO2 DESIGN REMOVAL EFFICIENCY - %                  60.0

** MIST ELIMINATOR
    TYPE                                            CHEVRON
```

EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

KANSAS POWER & LIGHT: JEFFREY 2 (CONT.)

** PUMPS

SERVICE	NUMBER
******	****

** REHEATER

TYPE	BYPASS
TEMPERATURE BOOST - C	25.0 (45 F)

** WATER LOOP

TYPE	CLOSED

** TREATMENT

TYPE	BOTTOM ASH STABILIZATION

** DISPOSAL

NATURE	FINAL
TYPE	LINED POND
LOCATION	ON SITE
TRANSPORTATION	PUMPED

------------------------------PERFORMANCE DATA------------------------------

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATIONS AT JEFFREY 2 BEGAN IN JANUARY 1980. NO MAJOR PROBLEMS HAVE BEEN ENCOUNTERED SINCE STARTUP.

4/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE SYSTEM WAS STILL IN THE SHAKEDOWN/DEBUGGING PHASE.

5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

COMMERCIAL OPERATIONS BEGAN ON MAY 1, 1980. SINCE THEN THERE HAVE BEEN NO PROBLEMS ENCOUNTERED WITH THE FGD SYSTEM. THE UNIT HAS OPERATED 100% OF THE TIME.

7/80	SYSTEM	100.0	100.0	100.0	95.3			744	709	709	81.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY A 35 HOUR OUTAGE OCCURRED DUE TO A REHEATER TUBE LEAK IN THE BOILER. NO FGD-RELATED OUTAGES OCCURRED DURING THE MONTH.

8/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	80.1
9/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	73.3

** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WERE ENCOUNTERED WITH THE BOILER OR THE FGD SYSTEM DURING THE AUGUST AND SEPTEMBER PERIOD.

SECTION 3

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KANSAS POWER & LIGHT	
PLANT NAME	LAWRENCE	
UNIT NUMBER	4	
CITY	LAWRENCE	
STATE	KANSAS	
GROSS UNIT GENERATING CAPACITY - MW	125.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	115.0	
EQUIVALENT SCRUBBED CAPACITY - MW	125.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
AVERAGE ASH CONTENT - %	9.80	
AVERAGE MOISTURE CONTENT - %	12.00	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	1/76	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	73.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	98.90	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FORCED OXIDATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		100.0			744	744	744	
2/80	SYSTEM		100.0		100.0			696	696	696	
3/80	SYSTEM		100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS WERE REPORTED FOR THE LAWRENCE 4 SCRUBBER DURING THE FIRST QUARTER 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	80.0			720	576	576	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OFF LINE FOR SIX DAYS IN APRIL FOR A SCHEDULED INSPECTION. DURING THE BOILER OUTAGE GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

KANSAS POWER & LIGHT: LAWRENCE 4 (CONT.)

```
-------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED 100% OF THE TIME IN
                           MAY AND JUNE.

 7/80  SYSTEM      96.8        96.8        96.8        96.8                   744   744    720  54.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           A STORAGE TANK ERODED COMPLETELY THROUGH CAUSING A TWO DAY OUTAGE IN
                           JULY.

 8/80  SYSTEM     100.0       100.0       100.0       100.0                   744   744    744  50.2

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM OR THE BOILER DURING
                           AUGUST.

 9/80  SYSTEM      96.9       100.0       100.0        40.3                   720   290    290  16.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE BOILER WAS OUT OF SERVICE FOR APPROXIMATELY 17 DAYS FOR A BOILER
                           INSPECTION.

                           ECONOMIZER WELD REPAIRS CAUSED THE SYSTEM TO REMAIN OUT OF SERVICE FOR
                           22 HOURS.
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                                   SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
-------------------------------------------------------------------------------------------------------

COMPANY NAME                                           KANSAS POWER & LIGHT
PLANT NAME                                             LAWRENCE
UNIT NUMBER                                            5
CITY                                                   LAWRENCE
STATE                                                  KANSAS
GROSS UNIT GENERATING CAPACITY - MW                      420.0
NET UNIT GENERATING CAPACITY W/FGD - MW                  400.0
EQUIVALENT SCRUBBED CAPACITY - MW                        420.0

** FUEL DATA
   FUEL TYPE                                           COAL
   FUEL GRADE                                          ******
   AVERAGE HEAT CONTENT - J/G                           23260.        ( 10000 BTU/LB)
   AVERAGE ASH CONTENT - %                                  9.80
   AVERAGE MOISTURE CONTENT - %                            12.00
   AVERAGE SULFUR CONTENT - %                                .55
   AVERAGE CHLORIDE CONTENT - %                              .03

** GENERAL EMISSION CONTROL SYSTEM DATA
   GENERAL PROCESS TYPE                                WET SCRUBBING
   PROCESS TYPE                                        LIMESTONE
   SYSTEM SUPPLIER                                     COMBUSTION ENGINEERING
   NEW/RETROFIT                                        RETROFIT
   ENERGY CONSUMPTION - %                              *******
   INITIAL START-UP DATE                               11/71
   COMMERCIAL START-UP DATE                            **/**
   SO2 DESIGN REMOVAL EFFICIENCY - %                      52.00
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %              98.90
   ABSORBER SPARE CAPACITY INDEX - %                        .0
   ABSORBER SPARE COMPONENTS INDEX                          .0

** WATER LOOP
   TYPE                                                CLOSED
   FRESH MAKE-UP WATER - LITER/S                       *******         (***** GPM)

** TREATMENT
   TYPE                                                FORCED OXIDATION

** DISPOSAL
   TYPE                                                POND


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                 100.0                   100.0                  744    744    744

 2/80  SYSTEM                 100.0                    51.7                  696    360    360

 3/80  SYSTEM                 100.0                    54.8                  744    408    408

      ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE FGD SYSTEM OPERATED WITHOUT ANY MAJOR PROBLEMS DURING THE FIRST
                         QUARTER OF 1980.  THE BOILER WAS DOWN FROM MID-FEBRUARY TO MID-MARCH
                         FOR TURBINE REPAIRS, DURING WHICH TIME GENERAL SCRUBBER MAINTENANCE
                         WAS PERFORMED.

 4/80  SYSTEM     100.0       100.0       100.0       100.0                  720    720    720

 5/80  SYSTEM     100.0       100.0       100.0        80.6                  744    600    600

 6/80  SYSTEM     100.0       100.0       100.0       100.0                  720    720    720

      ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER WAS DOWN FOR SIX DAYS DURING MAY FOR A SCHEDULED INSPECTION.
                         DURING THIS TIME GENERAL MAINTENANCE WAS PERFORMED ON THE FGD SYSTEM.
                         OTHER THAN THIS TIME, THE FGD SYSTEM OPERATED 100% OF THE TIME DURING
                         THE APRIL-JUNE PERIOD.

 7/80  SYSTEM     100.0       100.0       100.0        96.1                  744    715    715  54.0
```

EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

KANSAS POWER & LIGHT: LAWRENCE 5 (CONT.)

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             A 29 HOUR OUTAGE OCCURRED AS A RESULT OF A REHEATER TUBE LEAK IN THE
                             BOILER.  NO FGD SYSTEM-RELATED PROBLEMS OCCURRED DURING JULY.

 8/80  SYSTEM      100.0       100.0       100.0        81.5                    744   606    606  43.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE OUTAGE TIME IN AUGUST WAS DUE TO NECESSARY REPAIR OF A BOILER REHEAT
                             TUBE.

 9/80  SYSTEM      100.0       100.0       100.0        95.7                    720   689    689  38.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE BOILER WAS OUT OF SERVICE FOR APPROXIMATELY 31 HOURS FOR A SCHEDULED
                             INSPECTION.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	KENTUCKY UTILITIES	
PLANT NAME	GREEN RIVER	
UNIT NUMBER	1-3	
CITY	CENTRAL CITY	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	64.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	60.0	
EQUIVALENT SCRUBBED CAPACITY - MW	64.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25586.	(11000 BTU/LB)
AVERAGE ASH CONTENT - %	13.40	
AVERAGE MOISTURE CONTENT - %	12.10	
AVERAGE SULFUR CONTENT - %	4.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AMERICAN AIR FILTER	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.1	
INITIAL START-UP DATE	9/75	
COMMERCIAL START-UP DATE	6/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	4.7	(75 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0			.0			744	0	0	.0
2/80	SYSTEM	100.0			.0			696	0	0	.0
3/80	SYSTEM	100.0			.0			744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER REMAINED OUT OF SERVICE DUE TO BOILER REPAIRS. THE UNIT IS EXPECTED TO BE OPERATING IN MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0			.0			720	0	0	.0
5/80	SYSTEM	100.0			.0			744	0	0	.0
6/80	SYSTEM	100.0			.0			720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM REMAINED OFF LINE DURING THE SECOND QUARTER OF 1980 AS A RESULT OF THE ON-GOING BOILER REPAIRS. COMPLETION OF THE BOILER REPAIRS HAS BEEN DELAYED BY THE UNAVAILABILITY OF SOME NEEDED PARTS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	100.0			.0			744	0	0	.0

KENTUCKY UTILITIES: GREEN RIVER 1-3 (CONT.)

```
-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               THE BOILER REPAIRS HAVE BEEN COMPLETED; HOWEVER, THE BOILER DID NOT
                               OPERATE DUE TO REPAIR WORK BEING DONE ON THE TURBINE.

 8/80  SYSTEM     100.0                                 .0                      744     0      0    .0

 9/80  SYSTEM     100.0                                 .0                      720     0      0    .0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               TURBINE REPAIRS CONTINUED THROUGH AUGUST AND SEPTEMBER.  THE FGD SYSTEM
                               WAS AVAILABLE FOR OPERATION.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	4	
CITY	LOUISVILLE	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	188.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	175.0	
EQUIVALENT SCRUBBED CAPACITY - MW	188.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	17.10	
AVERAGE MOISTURE CONTENT - %	9.00	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AMERICAN AIR FILTER	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	1.6	
INITIAL START-UP DATE	8/76	
COMMERCIAL START-UP DATE	8/77	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	6.3	(100 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		95.6			744	711	711	
2/80	SYSTEM		99.8		66.7			696	465	464	
3/80	SYSTEM		80.5		74.3			744	687	553	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED FOR THE FIRST QUARTER OF 1980 WITH EITHER THE BOILER OR THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	99.0	98.8	98.8	79.9			720	582	575	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL SPRAY PUMP PROBLEMS CAUSED SEVEN HOURS OF OUTAGE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	96.8	100.0	100.0	7.0			744	52	52	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS NOT NEEDED MOST OF MAY, THIS ACCOUNTS FOR THE LOW UTILIZATION OF THE FGD SYSTEM.

ONE DAY OF OUTAGE TIME IN MAY WAS CAUSED BY A LEAK IN A SPRAY PUMP SEAL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	.0	.0		.0			720	350	0	

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EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

LOUISVILLE GAS & ELECTRIC: CANE RUN 4 (CONT.)


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING PART OF JUNE THE BOILER WAS ON RESERVE, IN WHICH TIME THE SCRUBBER
                              DUCTWORK AND LININGS WERE REPAIRED.

                              REPAIRS WERE MADE TO MODULE LININGS AND DUCTWORK.  DUCTWORK REPAIRS/
                              REPLACEMENTS WERE MADE WITH 316 SS.

                              ALSO DURING THE DOWN TIME THE EXPANSION JOINT LOCATED AT THE DISCHARGE
                              OF THE BOOSTER PUMP WAS REPLACED.

7/80   A          85.7         92.8        92.8        85.7
       B          85.7         92.8        92.8        85.7
       SYSTEM     85.7         92.8        92.8        85.7     87.00 99.00   744   687    638

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              PROBLEMS WERE ENCOUNTERED WITH THE OIL REHEAT SYSTEM DURING JULY.

                              SPRAY PUMP AND VALVE FAILURES ENCOUNTERED DURING THE MONTH ACCOUNTED FOR
                              SOME OF THE FGD SYSTEM DOWN TIME.

8/80   SYSTEM    100.0         99.3        99.3        76.9                   744   576    572  50.0

9/80   SYSTEM    100.0        100.0       100.0        35.7                   720   257    257  50.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE UTILITY REPORTED THAT NO MAJOR OUTAGES OCCURRED DURING AUGUST AND
                              SEPTEMBER.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	CANE RUN	
UNIT NUMBER	5	
CITY	LOUISVILLE	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	200.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	192.0	
EQUIVALENT SCRUBBED CAPACITY - MW	200.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	17.10	
AVERAGE MOISTURE CONTENT - %	9.00	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	COMBUSTION ENGINEERING	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	1.5	
INITIAL START-UP DATE	12/77	
COMMERCIAL START-UP DATE	7/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	POZ-O-TEC	
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		92.1		72.2			744	583	537	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY NO OPERATIONAL PROBLEMS WERE ENCOUNTERED.

2/80	SYSTEM		71.9		49.7			696	481	346	

** PROBLEMS/SOLUTIONS/COMMENTS

IN FEBRUARY THE UTILITY RAN OUT OF CARBIDE LIME CAUSING INTERRUPTION OF THE FGD SYSTEM OPERATION. THE UNAVAILABILITY OF LIME WAS CAUSED BY FREEZE UPS ENCOUNTERED BY AIRCO, THE LIME SUPPLIER.

3/80	SYSTEM		44.5		27.2			744	454	202	

** PROBLEMS/SOLUTIONS/COMMENTS

REHEATER TUBE PROBLEMS WERE ENCOUNTERED IN FEBRUARY AND CONTINUED THROUGH MARCH. THE UTILITY HOPES TO REPLACE THE TUBE BUNDLES IN THE SUMMER.

4/80	SYSTEM	.0			.0			720	0	0	.0

```
-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE FGD SYSTEM WAS OFF LINE THE ENTIRE MONTH OF APRIL TO INSTALL
                                  STAINLESS STEEL (316 SS) IN THE DUCTWORK AND IN THE MODULES.

 5/80  SYSTEM        95.3        94.5        94.5        80.2                   744   632    597

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  DURING MAY ONE DAY OF OUTAGE TIME WAS NECESSARY TO COMPLETE THE INSTALLA-
                                  TION OF THE STAINLESS STEEL IN THE DUCTWORK AND MODULES.

                                  A PUMP SEAL ON THE RECIRCULATION PUMP FAILED CAUSING APPROXIMATELY 10
                                  HOURS OF OUTAGE TIME.

 6/80  SYSTEM        78.8        74.4        74.4        61.8                   720   598    445

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  DURING JUNE THE SYSTEM HAD TO BE TAKEN OFF LINE FOR 153 HOURS DUE TO THE
                                  POOR WELDS ON THE TUBE BUNDLES IN THE REHEATER.  THE TUBE BUNDLES HAVE
                                  BEEN A CONSTANT PROBLEM AND THE MANUFACTURER IS SCHEDULED TO REPLACE
                                  THEM IN THE FALL.

 7/80  SYSTEM        78.7        87.6        87.6        78.7   85.00 99.00     744   669    586

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  DURING JULY THE REHEAT TUBE EXCHANGERS FAILED.  TWO NEW EXCHANGERS ARE
                                  NOW ON SITE AND ARE SCHEDULED TO BE INSTALLED IN NOVEMBER OR DECEMBER 1980.

                                  A THREE DAY OUTAGE OCCURRED IN JULY DUE TO A LIMESTONE ROCK DISABLING
                                  THE THICKENER.

 8/80  SYSTEM        49.6        58.4        58.4        49.6                   744   632    369  50.0

 9/80  SYSTEM        87.2        97.5        97.5        87.2                   720   644    628  50.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE OUTAGE TIME DURING AUGUST AND SEPTEMBER WAS CAUSED BY A REHEAT TUBE
                                  BUNDLE FAILURE.  THE BUNDLES ARE PRESENTLY BEING REPLACED IN BOTH MODULES.
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                                    SECTION 3
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
---------------------------------------------------------------------------------------------------

 COMPANY NAME                                     LOUISVILLE GAS & ELECTRIC
 PLANT NAME                                       CANE RUN
 UNIT NUMBER                                      6
 CITY                                             LOUISVILLE
 STATE                                            KENTUCKY
 GROSS UNIT GENERATING CAPACITY - MW                299.0
 NET UNIT GENERATING CAPACITY W/FGD - MW            277.0
 EQUIVALENT SCRUBBED CAPACITY - MW                  299.0

 ** FUEL DATA
     FUEL TYPE                                    COAL
     FUEL GRADE                                   BITUMINOUS
     AVERAGE HEAT CONTENT - J/G                    25586.         ( 11000 BTU/LB)
     AVERAGE ASH CONTENT - %                          17.10
     AVERAGE MOISTURE CONTENT - %                      9.00
     AVERAGE SULFUR CONTENT - %                        4.80
     AVERAGE CHLORIDE CONTENT - %                       .04

 ** GENERAL EMISSION CONTROL SYSTEM DATA
     GENERAL PROCESS TYPE                         WET SCRUBBING
     PROCESS TYPE                                 DUAL ALKALI
     SYSTEM SUPPLIER                              COMBUSTION EQUIP ASSOCIATES
     NEW/RETROFIT                                 RETROFIT
     ENERGY CONSUMPTION - %                           1.0
     INITIAL START-UP DATE                         4/79
     COMMERCIAL START-UP DATE                     **/**
     SO2 DESIGN REMOVAL EFFICIENCY - %               95.00
     PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.00
     ABSORBER SPARE CAPACITY INDEX - %               20.0
     ABSORBER SPARE COMPONENTS INDEX                   .3

 ** WATER LOOP
     TYPE                                         CLOSED
     FRESH MAKE-UP WATER - LITER/S                *******        (***** GPM)

 ** DISPOSAL
     TYPE                                         LANDFILL


---------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM                  49.0                   13.8                   744   210    103

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         FGD SYSTEM OUTAGE TIME IN JANUARY WAS CAUSED BY A THICKENER FAILURE.
                         THE RAKE BECAME INOPERABLE BECAUSE OF HIGH SOLIDS AND THE THICKENER HAD
                         TO BE CLEANED OUT.

 2/80  SYSTEM                  64.7                   47.0                   696   386    327

 3/80  SYSTEM                  70.0                   64.5                   744   686    480

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         IN FEBRUARY AND MARCH OUTAGE TIME WAS CAUSED BY PROBLEMS WITH THE RECYCLE
                         PUMPS.

 4/80  SYSTEM      95.8        91.5        97.7       73.9     95.00 99.00  720   581    531

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE BOILER OUTAGES IN APRIL WERE A RESULT OF THE LOSS OF ONE OF THE BOILER
                         FEED PUMPS AND BECAUSE THE LOAD WAS NOT NEEDED.

                         THE FGD OUTAGES WERE A RESULT OF HIGH BOOSTER FAN SUCTION TRIPS, REPAIRS
                         TO THE IUCS SYSTEM, REPAIRS TO THE THICKENER UNDERFLOW LINE AND A PLANNED
                         INSPECTION OF THE TRAYS.  THE TRAY PLUGGING PROBLEM WAS SOLVED BY A
                         SLIGHT PH ADJUSTMENT IN THE REACTORS.

 5/80  SYSTEM      99.6        99.9        99.9       99.5                   744   741    740
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-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

      ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING MAY THE PRESSURE RELIEF VALVE ON THE BOOSTER FAN MALFUNCTIONED
                              FORCING THE FGD SYSTEM OUT OF SERVICE.

 6/80  SYSTEM      99.9         99.8        99.9        88.9                      720   642    640

      ** PROBLEMS/SOLUTIONS/COMMENTS

                              A SPRAY PUMP MALFUNCTION CAUSED THE SYSTEM TO SHUTDOWN.  APPROXIMATELY
                              ONE HOUR WAS NEEDED TO PUT THE SPARE INTO SERVICE.

                              THE BOILER WAS OFF FOR REPAIRS TO THE CLINKER GRINDER AND TO REPAIR A
                              BOILER TUBE LEAK.

                              IMPROVEMENTS TO THE PH CONTROL CIRCUITRY HAVE LEAD TO IMPROVED CARBIDE
                              LIME UTILIZATION.

                              EXPERIMENTATION WITH A NEW FILTER CLOTH HAS SHOWN AN IMPROVEMENT IN SODA
                              ASH CONSUMPTION.

                              SULFUR DIOXIDE EMISSIONS AVERAGED LESS THAN 200 PPM FOR JUNE.

 7/80  SYSTEM      99.9         99.9        99.7        82.9                      744   618    617

      ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING THE PERIOD FROM JULY 17 THROUGH JULY 28 AN ACCEPTANCE TEST WAS RUN.
                              DURING THE TEST THE FGD SYSTEM EXPERIENCED NO MAJOR PROBLEMS OR OUTAGE
                              TIME.  THE AVERAGE SO2 REMOVAL EFFICIENCY DURING THE TEST WAS 95.1%.

                              DURING NORMAL OPERATION IN JULY NO MAJOR FGD RELATED PROBLEMS WERE
                              ENCOUNTERED.

 8/80  SYSTEM      99.3         94.6        94.6        84.5                      744   665    628   50.0

 9/80  SYSTEM      99.0         98.6        99.8        86.9                      720   635    626   50.0

      ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THE MONTHS OF
                              AUGUST AND SEPTEMBER.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC	
PLANT NAME	MILL CREEK	
UNIT NUMBER	3	
CITY	LOUISVILLE	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	442.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	420.0	
EQUIVALENT SCRUBBED CAPACITY - MW	442.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	11.50	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.04	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	AMERICAN AIR FILTER	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.6	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	3/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	9.4	(150 GPM)
** TREATMENT		
TYPE	FLYASH/LIME STABILIZATION	
** DISPOSAL		
TYPE	POND	

```
---------------------------------------PERFORMANCE DATA----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
 1/80  SYSTEM
                                                   .0                      744     0      0    .0
       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING THE OVERHAUL GENERAL SCRUBBER MAINTENANCE WAS DONE BUT NO MAJOR
                         MODIFICATIONS WERE MADE.
 2/80  SYSTEM                36.1
                                                  26.6                     696   512    185
       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE UNIT CAME BACK ON LINE ON FEBRUARY 10 AFTER THE TURBINE OVERHAUL
                         WORK WAS COMPLETED.
 3/80  SYSTEM                36.9
                                                  30.6                     744   618    228
       ** PROBLEMS/SOLUTIONS/COMMENTS

                         PROBLEMS ENCOUNTERED DURING FEBRUARY AND MARCH WITH THE FGD SYSTEM
                         OPERATION INCLUDED FROZEN WATER LINES AND WORN GASKETS BLOWING IN THE
                         REHEATER FLANGES.

                         THE UTILITY IS IN THE PROCESS OF REPLACING THE REHEATER TUBES.
 4/80  SYSTEM      42.9      42.5        42.5        42.2     85.00 99.40  720   715    304
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LOUISVILLE GAS & ELECTRIC: MILL CREEK 3 (CONT.)

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE REHEATER TUBE REPLACEMENT CONTINUED INTO APRIL.

                       THE OTHER OUTAGE TIME ENCOUNTERED DURING APRIL WAS CAUSED BY A BLOWN
                       GASKET IN THE CONDENSATE PUMP.

 5/80  SYSTEM       67.5         51.4        51.6        34.4                      744   498    256

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       DURING MAY THE PLASTIC MIST ELIMINATOR COMPONENTS WERE REPLACED WITH
                       STAINLESS STEEL.  THIS KEPT THE SYSTEM OFF LINE FOR APPROXIMATELY 10 DAYS.

                       REHEATER TUBE LEAKS WERE ALSO ENCOUNTERED IN MAY.

 6/80  SYSTEM       88.2           .0          .0          .0                      720    85      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       IN LATE MAY THE TURBINE LOST TWO BLADES CAUSING THE SYSTEM TO SHUTDOWN
                       UNTIL THE LATTER PART OF JUNE.  DURING THE OUTAGE THE UTILITY DECIDED
                       TO REPLACE THE LIME STORAGE TANK LINES WITH LARGER ONES TO SERVICE THE
                       NEW UNITS.  THE WORK WAS NOT COMPLETED WHEN THE BOILER WAS RETURNED
                       TO SERVICE; THUS, THE FGD UNIT DID NOT OPERATE DURING THE MONTH.

 7/80  SYSTEM       92.0         91.3        91.3        83.9                      744   684    625

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       RECYCLE PUMP FAILURES CAUSED THE FGD SYSTEM TO SHUTDOWN FOR PART OF JULY.

 8/80  SYSTEM       58.7         81.7        81.7        58.7                      744   535    437  60.0

 9/80  SYSTEM       57.2         60.4        60.4        57.2                      720   682    412  60.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       DURING THE AUGUST THROUGH SEPTEMBER PERIOD THE PUMP HOUSE WAS FLOODED
                       DUE TO THE FAILURE OF THE BLEED PUMP FRP PIPE LINE.  BECAUSE OF THIS
                       FAILURE, 23 PUMPS AND 23 PUMP MOTORS WERE DAMAGED.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	LOUISVILLE GAS & ELECTRIC
PLANT NAME	PADDY'S RUN
UNIT NUMBER	6
CITY	LOUISVILLE
STATE	KENTUCKY
GROSS UNIT GENERATING CAPACITY - MW	72.0
NET UNIT GENERATING CAPACITY W/FGD - MW	67.0
EQUIVALENT SCRUBBED CAPACITY - MW	72.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	26749. (11500 BTU/LB)
AVERAGE ASH CONTENT - %	11.50
AVERAGE MOISTURE CONTENT - %	********
AVERAGE SULFUR CONTENT - %	2.50
AVERAGE CHLORIDE CONTENT - %	********
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIME
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	2.8
INITIAL START-UP DATE	4/73
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.10
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	3.1 (50 GPM)
** TREATMENT	
TYPE	LIME STABILIZATION
** DISPOSAL	
TYPE	POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM				.0			744	0	0	.0
2/80	SYSTEM				.0			696	0	0	.0
3/80	SYSTEM				.0			744	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THIS UNIT DID NOT OPERATE DURING THE FOURTH QUARTER OF 1979 OR THE FIRST QUARTER OF 1980 DUE TO A LACK OF DEMAND. THIS UNIT IS USED AS A PEAKING UNIT AND WILL BE RETIRED SOMETIME IN 1987.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0			.0			720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL THE FGD SYSTEM WAS AVAILABLE 100% OF THE TIME BUT WAS NOT OPERATED DUE TO A BOILER RELATED PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	66.6	66.6	7.8			744	67	58	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY, NINE HOURS OF OUTAGE TIME RESULTED FROM THE UNAVAILABLITY OF THE LIME SLURRY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	100.0	94.1	94.1	6.7			720	51	48	

EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

LOUISVILLE GAS & ELECTRIC: PADDY'S RUN 6 (CONT.)

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------------------------------------------PERFORMANCE DATA----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE THREE HOURS THE SCRUBBERS DID NOT OPERATE IN JUNE WAS DUE TO THE FACT
                                     THAT THE BOILER WAS BROUGHT ON LINE BEFORE THE SCRUBBER OPERATORS WERE
                                     ON DUTY.

7/80   A          100.0                                      .0
       B          100.0                                      .0
       SYSTEM     100.0                                      .0                 744     0      0     .0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE BOILER AND FGD SYSTEM DID NOT OPERATE DURING THE MONTH OF JULY DUE TO
                                     A LACK OF DEMAND.

8/80   SYSTEM     100.0                                      .0                 744     0      0     .0

9/80   SYSTEM     100.0                                      .0                 720     0      0     .0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE BOILER DID NOT OPERATE DURING AUGUST AND SEPTEMBER.  THE FGD SYSTEM
                                     WAS AVAILABLE 100% OF THE TIME.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                     MINNESOTA POWER & LIGHT
PLANT NAME                                       CLAY BOSWELL
UNIT NUMBER                                      4
CITY                                             COHASSET
STATE                                            MINNESOTA
REGULATORY CLASSIFICATION                        B
PARTICULATE EMISSION LIMITATION - NG/J             43.          (  .100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                    516.          ( 1.200 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW               1000.0
GROSS UNIT GENERATING CAPACITY - MW               554.0
NET UNIT GENERATING CAPACITY W/FGD - MW           504.0
NET UNIT GENERATING CAPACITY WO/FGD - MW          511.0
EQUIVALENT SCRUBBED CAPACITY - MW                 475.0

** BOILER DATA
   SUPPLIER                                      COMBUSTION ENGINEERING
   TYPE                                          PULVERIZED COAL
   SERVICE LOAD                                  BASE
   COMMERCIAL SERVICE DATE                        2/80
   MAXIMUM BOILER FLUE GAS FLOW - CU.M/S         1086.40        (2302181 ACFM)
   FLUE GAS TEMPERATURE - C                       148.9         ( 300 F)
   STACK HEIGHT - M                               183.          ( 600 FT)
   STACK TOP DIAMETER - M                          11.3         ( 37.0 FT)

** FUEL DATA
   FUEL TYPE                                     COAL
   FUEL GRADE                                    SUBBITUMINOUS
   AVERAGE HEAT CONTENT - J/G                     19276.        (  8287 BTU/LB)
   RANGE HEAT CONTENT - BTU/LB                                   7509 - 9923
   AVERAGE ASH CONTENT - %                            9.40
   RANGE ASH CONTENT - %                         4.81 - 15.99
   AVERAGE MOISTURE CONTENT - %                     24.50
   RANGE MOISTURE CONTENT - %                    20.30 - 26.31
   AVERAGE SULFUR CONTENT - %                         .94
   RANGE SULFUR CONTENT - %                      0 - 4.55
   AVERAGE CHLORIDE CONTENT - %                       .01
   RANGE CHLORIDE CONTENT - %                    0 - 0.07

** GENERAL EMISSION CONTROL SYSTEM DATA
   SALEABLE PRODUCT/THROWAWAY PRODUCT            THROWAWAY PRODUCT
   GENERAL PROCESS TYPE                          WET SCRUBBING
   PROCESS TYPE                                  LIME/ALKALINE FLYASH
   PROCESS ADDITIVES                             NONE
   SYSTEM SUPPLIER                               PEABODY PROCESS SYSTEMS
   A-E FIRM                                      EBASCO
   CONSTRUCTION FIRM                             PEABODY PROCESS SYSTEMS
   DEVELOPMENT LEVEL                             FULL SCALE
   NEW/RETROFIT                                  NEW
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.73
   SO2 DESIGN REMOVAL EFFICIENCY - %                84.55
   INITIAL START-UP                               4/80
   CONSTRUCTION COMPLETION                        2/80
   CONSTRUCTION INITIATION                        5/78
   LETTER OF INTENT SIGNED                        2/77
   STARTED REQUESTING BIDS                        4/76
   STARTED PRELIMINAY DESIGN                      6/75

** ESP
   NUMBER                                         1
   TYPE                                          HOT SIDE
   SUPPLIER                                      JOY
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %        99.7
   FLUE GAS CAPACITY - CU.M/S                       94.4        ( 200000 ACFM)
   FLUE GAS TEMPERATURE - C                        398.9        (  750 F)
   PRESSURE DROP - KPA                           *******        (***** IN-H2O)
   PARTICULATE OUTLET LOAD - G/CU.M                   .07       (    .03 GR/SCF)

** PARTICLE SCRUBBER
   NUMBER                                         4
   TYPE                                          RADIAL VENTURI VARIABLE THROAT
   SUPPLIER                                      PEABODY PROCESS SYSTEMS
   NUMBER OF STAGES                                  1
   SHELL MATERIAL                                STAINLESS STEEL
   LINING MATERIAL                               RUBBER
```

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

INTERNAL MATERIAL	STAINLESS STEEL	
NUMBER OF NOZZLES	13	
TYPE OF NOZZLES	TANGENTIAL AND BULL NOZZLES	
BOILER LOAD/SCRUBBER - %	33.3	
FLUE GAS CAPACITY - CU.M/S	394.4	(835840 ACFM)
FLUE GAS TEMPERATURE - C	148.9	(300 F)
LIQUID RECIRCULATION RATE - LITER/S	841.7	(13360 GPM)
L/G RATIO - LITER/CU.M	2.7	(20.0 GAL/1000ACF)
PRESSURE DROP - KPA	*******	(***** IN-H2O)
PARTICULATE INLET LOAD - NG/J	5159.	(12.000 LB/MMBTU)
PARTICULATE OUTLET LOAD - NG/J	43.	(.100 LB/MMBTU)
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.7	
SO2 INLET CONCENTRATION - NG/J	2752.	(6.400 LB/MMBTU)
SO2 DESIGN REMOVAL EFFICIENCY - %	89.0	

** ABSORBER

NUMBER	4	
TYPE	VENTURI/SPRAY TOWER	
INITIAL START UP	5/80	
SUPPLIER	PEABODY PROCESS SYSTEMS	
NUMBER OF STAGES	4	
DIMENSIONS - FT	DIA 35' HT 60'	
SHELL MATERIAL	CARBON STEEL	
SHELL LINER MATERIAL	RUBBER LINED	
INTERNAL MATERIAL	STAINLESS STEEL, CARBON STEEL & RUBBER LINED	
NUMBER OF NOZZLES	24	
NOZZLE TYPE	REFRAX NOZZLES	
BOILER LOAD/ABSORBER - %	33.3	
GAS FLOW - CU.M/S	302.08	(640130 ACFM)
GAS TEMPERATURE - C	53.3	(128 F)
LIQUID RECIRCULATION RATE - LITER/S	2104.	(33400 GPM)
L/G RATIO - L/CU.M	6.7	(50.0 GAL/1000ACF)
PRESSURE DROP - KPA	5.0	(20.0 IN-H2O)
SUPERFICAL GAS VELOCITY - M/SEC	3.7	(12.0 FT/S)
PARTICULATE INLET LOAD - G/CU.M	.1	(.030 GR/SCF)
PARTICULATE INLET LOAD - NG/J	43.	(.100 LB/MMBTU)
PARTICULATE OUTLET LOAD- G/CU.M	.1	(.030 GR/SCF)
PARTICULATE OUTLET LOAD - NG/J	43.	(.100 LB/MMBTU)
SO2 OUTLET CONTRATION - PPM	345	
SO2 OUTLET CONCENTRATION- NG/J	*****	(***** LB/MMBTU)
SO2 DESIGN REMOVAL EFFICIENCY - %	89.0	
ABSORBER SPARE CAPACITY INDEX - %	33.0	
ABSORBER SPARE COMPONENT INDEX	1.0	

** FANS

NUMBER	4	
TYPE	CENTRIFUGAL RADIAL TIP	
CONSTRUCTION MATERIALS	INCONEL 625 & INCOLY 825	
SERVICE - WET/DRY	WET	
CAPACITY - CU.M/S	320.33	(678800 ACFM)

** MIST ELIMINATOR

TYPE	SIEVE TRAY

** MIST ELIMINATOR

NUMBER	4	
TYPE	CHEVRON	
CONSTRUCTION MATERIAL	NORYL PLASTIC	
CONFIGURATION	HORIZONTAL	
NUMBER OF STAGES	1	
NUMBER OF PASSES	3	
FREEBOARD DISTANCE - M	1.52	(5.0 FT)
DEPTH - M	.30	(1.0 FT)
VANE SPACING - CM	3.5	(1.38 IN)
VANE ANGLES	90	
WASH SYSTEM	HOSE CONNECTION TO HEADER FOR MANUAL WASH	
SUPERFICIAL GAS VELOCITY - M/S	3.4	(11.0 FT/S)
PRESSURE DROP - KPA	.0	(.0 IN-H2O)

** PROCESS CONTROL CHEMISTRY

CONTROL VARIABLES	PH-DENSITY IN RECYCLE TANKS
CONTROL RANGE	3-6 PH; 7-9% DENSITY
CONTROL MANNER	AUTOMATIC
MODE	FEEDBACK
SENSOR LOCATION	RECYCLE TANKS

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

** PUMPS

SERVICE	NUMBER
ALKALI FEED	2
FLY ASH SLURRY FEED	2
VENTURI RECYCLE	8
ABSORBER RECYCLE	12
WASH WATER	2
******	****

** TANKS

SERVICE	NUMBER
RECYCLE	4
ALKALI STORAGE	1
WASH WATER	1
FLY ASH STORAGE	1

** REHEATER

NUMBER	4	
TYPE	BYPASS	
HEATING MEDIUM	FLUE GAS	
TEMPERATURE BOOST - C	14.4	(26 F)

** WATER LOOP

TYPE	CLOSED	
EVAPORATOR WATER LOSS - LITER/S	23.9	(380 GPM)
RECOVERED WATER RETURN - LITER/S	188.1	(2985 GPM)
FRESH MAKEUP WATER ADDITION - LITERS/S	56.4	(895 GPM)

** REAGENT PREPARATION EQUIPMENT

NUMBER OF STORAGE HOPPERS	5	
NUMBER OF SLAKERS	4	
SLAKER CAPACITY - M T/H	.4	(.4 TPH)
REAGENT PRODUCT - % SLURRY SOLIDS	20.0	
POINT OF ADDITION	RECYCLE TANKS	

** DISPOSAL

NATURE	FINAL	
TYPE	LINED POND	
LOCATION	1 MILE WNW OF UNIT	
TRANSPORTATION	PIPE	
DIMENSIONS	4000 X 3000 FT	
AREA - ACRES	300.0	
CAPACITY - CU.M	9556522	(7814.0 ACRE-FT)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER BEGAN OPERATIONS ON FEBRUARY 26, 1980 AND FIRED OIL THROUGH THE MONTH OF MARCH. INITIAL FGD SYSTEM OPERATIONS BEGAN IN EARLY APRIL WITH THE BOILER FIRING COAL FOR TESTING PURPOSES. THE UNIT WAS SHUTDOWN IN MID-APRIL TO RECTIFY MINOR SHAKEDOWN PROBLEMS. A TRIAL RUN OF THE FGD SYSTEM IN AN INTEGRATED MODE OCCURRED IN LATE APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

SHAKEDOWN OPERATIONS CONTINUED THROUGH THE SECOND QUARTER OF 1980. THE FGD SYSTEM WILL BE FINE TUNED TO MEET DESIGN CRITERIA THROUGH JULY. TO DATE THE UTILITY REPORTED THAT, ALTHOUGH MANY TYPICAL STARTUP PROBLEMS ATTRIBUTABLE TO OPERATOR ERROR AS WELL AS MECHANICAL MALFUNCTIONS HAVE OCCURRED, NO UNUSUAL PROBLEMS HAVE OCCURRED. THE COMPLIANCE TEST IS SCHEDULED FOR EARLY SEPTEMBER.

MINNESOTA POWER & LIGHT: CLAY BOSWELL 4 (CONT.)

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	1		87.8	100.0	86.8						
	2		97.8	100.0	96.7						
	3		100.0	100.0	100.0						
	4		.0		.0						
	SYSTEM		96.1	100.0	95.0			720	712	684	79.0
8/80	1		71.8	100.0	62.9						
	2		75.5	100.0	66.1						
	3		29.4	100.0	25.8						
	4		49.7	100.0	43.5						
	SYSTEM		75.5	100.0	66.1			744	652	492	61.7
9/80	1		71.6	100.0	71.0						
	2		89.6	100.0	88.7						
	3		14.7	100.0	14.5						
	4		65.1	100.0	64.5						
	SYSTEM		80.3	100.0	79.6			744	737	592	73.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM IS STILL IN THE DEBUGGING PHASE OF OPERATION. MUCH OF THE EQUIPMENT IS STILL BEING WORKED ON AND TESTED.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MINNKOTA POWER COOPERATIVE	
PLANT NAME	MILTON R. YOUNG	
UNIT NUMBER	2	
CITY	CENTER	
STATE	NORTH DAKOTA	
GROSS UNIT GENERATING CAPACITY - MW	440.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	402.0	
EQUIVALENT SCRUBBED CAPACITY - MW	185.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	15119.	(6500 BTU/LB)
AVERAGE ASH CONTENT - %	6.50	
AVERAGE MOISTURE CONTENT - %	38.00	
AVERAGE SULFUR CONTENT - %	.70	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME/ALKALINE FLYASH	
SYSTEM SUPPLIER	COMBUSTION EQUIP ASSOCIATES	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.6	
INITIAL START-UP DATE	9/77	
COMMERCIAL START-UP DATE	6/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	36.13	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.60	
ABSORBER SPARE CAPACITY INDEX - %	100.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	44.1	(700 GPM)
** DISPOSAL		
TYPE	MINEFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	7.1	10.5		7.1						
	B	.0	.0		.0						
	SYSTEM	7.1	10.5	10.5	7.1			744	504	53	58.5

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY A COLD WEATHER CAUSED SOME PIPE LINES AND A BOOSTER FAN ICE UP.

A HIGH PERCENTAGE OF COARSE SOLIDS IN THE THICKENER CAUSED SOME OUTAGE TIME. THE WORM GEAR ON THE THICKENER FAILBD ADDING TO THE OUTAGE TIME.

CLEANING AND REPAIR OF THE THICKENER WAS COMPLICATED BY SUB-ZERO AMBIENT TEMPERATURES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	.0	.0		.0			696	696	0	97.1

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS RELATED TO THE COLD WEATHER CONTINUED THROUGH FEBRUARY. ICE ON THE BOOSTER FAN HAD TO BE MELTED BEFORE IT COULD BE OPERATED.

SHAFT SLEEVES ON SEVERAL SPRAY RECYCLE PUMPS WERE REPLACED DURING FEBRUARY.

THE GEAR REDUCER FAILED ON THE B-SIDE ABSORBER AGITATOR PREVENTING SCRUBBER OPERATION.

THE ISOLATION DAMPER CHAINS BROKE DURING THE MONTH.

MINNKOTA POWER COOPERATIVE: MILTON R. YOUNG 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	22.6	22.6		22.6						
	B	6.2	6.2		6.2						
	SYSTEM	28.9	28.8	28.8	28.8			744	743	214	89.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH COLD WEATHER CONTINUED TO BE A PROBLEM.

THE TORQUE SWITCHES ON THE ISOLATION DAMPERS WERE REPLACED. THE DAMPER PROBLEMS CAUSED THE BOOSTER FAN TO TRIP. THE OUTAGE TIME WAS EXTENDED BECAUSE THE UTILITY HAD TO WAIT FOR THE SWITCHES TO BE DELIVERED.

AN EXCESSIVE AMOUNT OF COARSE PARTICLES IN THE THICKENER CONTINUED TO BE A PROBLEM. PLUGGED BLEED LINES FROM THE ABSORBER TO THE THICKENER WERE ALSO ENCOUNTERED.

THE A-SIDE ABSORBER AGITATOR ANCHOR BOLTS SHEARED DURING MARCH CAUSING MODULE DOWN TIME.

THE SHAFT SLEEVES ON THE SPRAY RECYCLE PUMPS WOULD NOT HOLD THE PUMP GLAND PACKING. THE SHAFT SLEEVES ARE CURRENTLY BEING REPLACED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	100.0	.0		.0						
	B	.0	.0	.0	.0						
	SYSTEM	100.0	.0	.0	.0			720	154	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FOR APPROXIMATELY 3 WEEKS FOR THE ANNUAL UNIT OUTAGE DURING APRIL.

PLUGGED BLEED LINES AND THE REPLACEMENT OF THE SHAFT SLEEVES ON THE RECYCLE PUMPS CAUSED THE FGD SYSTEM TO REMAIN OFF LINE DURING THE TIME THE BOILER OPERATED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	.0	.0		.0						
	B	47.2	48.4	50.6	45.6						
	SYSTEM	47.2	48.4	50.6	45.6			744	700	339	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B WAS OPERATED DURING MAY WHILE REPAIR WORK WAS BEING DONE ON MODULE A.

THE REPAIRS ON MODULE A INCLUDED WORK ON THE SPRAY RECYCLE NOZZLE PIPING, AND THE RECYCLE HEADER.

THE VALVES ON BOTH THE SPRAY RECYCLE PUMP AND THE DISCHARGE SPRAY CYCLE PUMP WERE REPAIRED.

THE ABSORBER LINING HAS STARTED TO WEAR AND IS NOW BEING REPAIRED.

HIGH SOLIDS RESULTED IN THICKNER LINE PLUGGING. HIGH SOLIDS ALSO CAUSED PROBLEMS WITH THE RAKE AND CONE. BOTH THE THICKNER AND THE CLARIFIER HAD TO BE DRAINED AND CLEANED.

THE ABSORBER AGITATOR TUNNEL WAS ALSO CLEANED DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	.0	.0		.0						
	B	41.8	40.4	41.4	39.3						
	SYSTEM	41.8	40.4	41.4	39.3			720	701	283	

** PROBLEMS/SOLUTIONS/COMMENTS

MODULE B CONTINUED TO OPERATE THROUGH JUNE.

PROBLEMS WITH THE THICKNER CONTINUED THROUGH THE MONTH. HIGH SOLIDS CAUSED PROBLEMS WITH THE RAKE MECHANISM AND THE LIMIT SWITCH.

MINNKOTA POWER COOPERATIVE: MILTON R. YOUNG 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

TROUBLE WAS ENCOUNTERED DURING JUNE WITH THE VACUUM FILTER.

THE REPAIR WORK CONTINUED ON THE ABSORBER FLAKE LININGS.

MODULE A REPAIR WORK CONTINUED DURING JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	.0	.0		.0						
	B	65.3	64.5	65.8	52.0						
	SYSTEM	65.3	64.5	65.8	52.0			744	600	387	60.0

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH THE RAKE MECHANISM AND UNDERFLOW PUMPS IN THE THICKENER CONTINUED IN JULY. HIGH SOLIDS IN THE THICKENER ARE CAUSED WHEN FLY ASH IS ADDED TO THE LIME IN THE ABSORBER TOWER. THE ABSORBER REAGENT IS CHANGED TO STRAIGHT LIME WHEN THIS OCCURS.

PROBLEMS WERE ENCOUNTERED WITH THE TWO VACUUM FILTER PUMPS. ONE WAS BEING REBUILT WHILE THE OTHER FUNCTIONED POORLY.

REPAIRS WERE MADE TO THE LEAK IN THE ABSORBER TOWER.

PROBLEMS WERE REPORTED WITH THE MOTOR AND DISCHARGE VALVE ON THE TRAY RECYCLE PUMPS.

THE FGD SYSTEM WAS NOT PLACED IN SERVICE WHEN THE BOILER WAS RUN AT REDUCED LOAD DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	A	90.7	54.3	98.8	53.9						
	B	56.9	44.2	99.4	44.0						
	SYSTEM	99.2	98.6	99.2	98.0			744	739	729	92.8

** PROBLEMS/SOLUTIONS/COMMENTS

BOTH MODULES WERE OPERATED DURING AUGUST.

DURING THE MONTH, MAINTENANCE WORK WAS DONE ON THE TEFLON PACKING OF THE SPRAY RECYCLE PUMPS. THE VACUUM FILTER DRUM, SPRAY NOZZLES, THE ABSORBER AGITATOR, THE CLARIFIER CONE, AND THE THICKNER RAKE MECHANISM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	70.1	72.6	100.0	66.9						
	B	66.7	25.1	100.0	23.2						
	SYSTEM	100.0	97.9	100.0	90.3			720	664	650	78.5

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS AVAILABLE DURING ALL OF SEPTEMBER.

BOTH MODULES WERE OPERATED DURING THE MONTH.

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                                              SECTION 3
                      DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME
PLANT NAME                                        MONONGAHELA POWER
UNIT NUMBER                                       PLEASANTS
CITY                                              1
STATE                                             BELMONT
GROSS UNIT GENERATING CAPACITY - MW               WEST VIRGINIA
NET UNIT GENERATING CAPACITY W/FGD - MW             618.0
EQUIVALENT SCRUBBED CAPACITY - MW                   580.0
                                                    618.0
** FUEL DATA
   FUEL TYPE
   FUEL GRADE                                     COAL
   AVERAGE HEAT CONTENT - J/G                     BITUMINOUS
   AVERAGE ASH CONTENT - %                         27912.         ( 12000 BTU/LB)
   AVERAGE MOISTURE CONTENT - %                   ********
   AVERAGE SULFUR CONTENT - %                        15.00
   AVERAGE CHLORIDE CONTENT - %                       3.70
                                                  ********
** GENERAL EMISSION CONTROL SYSTEM DATA
   GENERAL PROCESS TYPE
   PROCESS TYPE                                   WET SCRUBBING
   SYSTEM SUPPLIER                                LIME
   NEW/RETROFIT                                   BABCOCK & WILCOX
   ENERGY CONSUMPTION - %                         NEW
   INITIAL START-UP DATE                          *******
   COMMERCIAL START-UP DATE                       3/79
   SO2 DESIGN REMOVAL EFFICIENCY - %              3/79
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %         90.00
   ABSORBER SPARE CAPACITY INDEX - %                 99.55
   ABSORBER SPARE COMPONENTS INDEX                     .0
                                                       .0
** WATER LOOP
   TYPE
   FRESH MAKE-UP WATER - LITER/S                  CLOSED
                                                  *******         (***** GPM)

-----------------------------------------PERFORMANCE DATA--------------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER   BOILER  FGD    CAP.
                                                                SO2  PART. HOURS  HOURS  HOURS  FACTOR
------ ------ ------------ ----------- ----------- -----------  ---- ----- -----  ------ -----  ------
 1/80  SYSTEM
                                                                             744
 2/80  SYSTEM
                                                                             690
 3/80  SYSTEM
                                                                             744
       ** PROBLEMS/SOLUTIONS/COMMENTS

                         NO INFORMATION WAS AVAILABLE ON THE OPERATIONS AT PLEASANTS 1 FOR THE
                         FIRST QUARTER OF 1980.
 4/80  SYSTEM
                                                                             720
 5/80  SYSTEM
                                                                             744
 6/80  SYSTEM
                                                                             720
       ** PROBLEMS/SOLUTIONS/COMMENTS

                         INFORMATION WAS UNAVAILABLE FOR THE SECOND QUARTER 1980 REPORT PERIOD.
 7/80  SYSTEM
                                                                             744
 8/80  SYSTEM
                                                                             744
 9/80  SYSTEM
                                                                             720
       ** PROBLEMS/SOLUTIONS/COMMENTS

                         INFORMATION FOR THE MONTHS OF AUGUST AND SEPTEMBER IS NOT AVAILABLE AT
                         THIS TIME.
```

MONONGAHELA POWER: PLEASANTS 1 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

AN EIGHT WEEK BOILER AND FGD SYSTEM SCHEDULED OUTAGE BEGAN DURING THE WEEK OF AUGUST 11. THE FGD SYSTEM WAS EXPECTED TO BE DOWN FOR 8-12 WEEKS.

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                                        SECTION 3
               DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                        MONTANA POWER
PLANT NAME                                          COLSTRIP
UNIT NUMBER                                         1
CITY                                                COLSTRIP
STATE                                               MONTANA
GROSS UNIT GENERATING CAPACITY - MW                   360.0
NET UNIT GENERATING CAPACITY W/FGD - MW               332.0
EQUIVALENT SCRUBBED CAPACITY - MW                     360.0

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                       20569.         (  8843 BTU/LB)
    AVERAGE ASH CONTENT - %                             9.60
    AVERAGE MOISTURE CONTENT - %                       23.90
    AVERAGE SULFUR CONTENT - %                           .77
    AVERAGE CHLORIDE CONTENT - %                         .01

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                                 COMBUSTION EQUIP ASSOCIATES
    NEW/RETROFIT                                    NEW
    ENERGY CONSUMPTION - %                             3.3
    INITIAL START-UP DATE                            9/75
    COMMERCIAL START-UP DATE                        11/75
    SO2 DESIGN REMOVAL EFFICIENCY - %                 60.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %         99.50
    ABSORBER SPARE CAPACITY INDEX - %                 20.0
    ABSORBER SPARE COMPONENTS INDEX                     .5

** WATER LOOP
    TYPE                                            CLOSED
    FRESH MAKE-UP WATER - LITER/S                     23.3          (  370 GPM)

** DISPOSAL
    TYPE                                            POND


---------------------------------------PERFORMANCE DATA---------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

12/79  SYSTEM       95.9                                                     744

 1/80  SYSTEM       96.5                                                     744

 2/80  SYSTEM       97.4                                                     696

 3/80  SYSTEM       95.4                                                     744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            TOTAL SYSTEM AVAILABILITY CONTINUES TO BE HIGH WITH NO MAJOR FGD SYSTEM
                            PROBLEMS REPORTED DURING THE FIRST QUARTER OF 1980.

 4/80  SYSTEM       99.8                                                     720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            NO MAJOR PROBLEMS WITH THE FGD SYSTEM WERE REPORTED BY THE UTILITY DURING
                            APRIL.

 5/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            NO AVAILABILITY DATA WERE REPORTED BY THE UTILITY BECAUSE OF A SCHEDULED
                            BOILER AND FGD SYSTEM OUTAGE FOR ROUTINE MAINTENANCE.

 5/80  SYSTEM                                                                720
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MONTANA POWER: COLSTRIP 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

PERFORMANCE INFORMATION FOR THE MONTH OF JUNE WAS NOT AVAILABLE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE THIRD QUARTER OF 1980 WAS NOT AVAILABLE.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	MONTANA POWER	
PLANT NAME	COLSTRIP	
UNIT NUMBER	2	
CITY	COLSTRIP	
STATE	MONTANA	
GROSS UNIT GENERATING CAPACITY - MW	360.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	332.0	
EQUIVALENT SCRUBBED CAPACITY - MW	360.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	20569.	(8843 BTU/LB)
AVERAGE ASH CONTENT - %	8.60	
AVERAGE MOISTURE CONTENT - %	23.90	
AVERAGE SULFUR CONTENT - %	.77	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME/ALKALINE FLYASH	
SYSTEM SUPPLIER	COMBUSTION EQUIP ASSOCIATES	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	3.3	
INITIAL START-UP DATE	5/76	
COMMERCIAL START-UP DATE	10/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	60.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	.5	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	23.3	(370 GPM)
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	SYSTEM	95.9						744			
1/80	SYSTEM	92.7						744			
2/80	SYSTEM	96.1						696			
3/80	SYSTEM	98.2						744			

** PROBLEMS/SOLUTIONS/COMMENTS

TOTAL FGD SYSTEM AVAILABILITY CONTINUES TO BE HIGH WITH NO MAJOR PROBLEMS REPORTED FOR THE FIRST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NO AVAILABILITY DATA WERE REPORTED BY THE UTILITY BECAUSE OF A BOILER AND FGD SYSTEM OUTAGE THAT WAS SCHEDULED FOR ROUTINE MAINTENANCE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	93.5						744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR PROBLEMS WITH THE FGD SYSTEM WERE REPORTED BY THE UTILITY DURING MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM							720			

MONTANA POWER: COLSTRIP 2 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
	** PROBLEMS/SOLUTIONS/COMMENTS										
	PERFORMANCE INFORMATION FOR THE MONTH OF JUNE WAS NOT AVAILABLE.										
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE THIRD QUARTER OF 1980 WAS NOT AVAILABLE.

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                                        SECTION 3
                     DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------------------------

COMPANY NAME
PLANT NAME                                          NEVADA POWER
UNIT NUMBER                                         REID GARDNER
CITY                                                1
STATE                                               MOAPA
GROSS UNIT GENERATING CAPACITY - MW                 NEVADA
NET UNIT GENERATING CAPACITY W/FGD - MW               125.0
EQUIVALENT SCRUBBED CAPACITY - MW                     110.0
                                                      125.0
** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                       28959.        ( 12450 BTU/LB)
    AVERAGE ASH CONTENT - %                             8.00
    AVERAGE MOISTURE CONTENT - %                        5.50
    AVERAGE SULFUR CONTENT - %                           .50
    AVERAGE CHLORIDE CONTENT - %                         .05

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    SODIUM CARBONATE
    SYSTEM SUPPLIER                                 COMBUSTION EQUIP ASSOCIATES
    NEW/RETROFIT                                    RETROFIT
    ENERGY CONSUMPTION - %                          *******
    INITIAL START-UP DATE                            3/74
    COMMERCIAL START-UP DATE                         4/74
    SO2 DESIGN REMOVAL EFFICIENCY - %                  90.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %          97.00
    ABSORBER SPARE CAPACITY INDEX - %                     .0
    ABSORBER SPARE COMPONENTS INDEX                       .0

** WATER LOOP
    TYPE                                            CLOSED
    FRESH MAKE-UP WATER - LITER/S                      9.8         (  155 GPM)

** DISPOSAL
    TYPE
                                                    LINED POND

----------------------------------------PERFORMANCE DATA----------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM     100.0       100.0       100.0       100.0                 744    744   744

      ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE BOILER AND FGD SYSTEM OPERATED THE ENTIRE MONTH WITH NO OUTAGES.

 2/80  SYSTEM     100.0       100.0       100.0       100.0                 696    696   696

      ** PROBLEMS/SOLUTIONS/COMMENTS

                        DURING FEBRUARY, NO OUTAGES OCCURRED.

 3/80  SYSTEM      93.8        83.3        84.4        33.6                 744    300   250

      ** PROBLEMS/SOLUTIONS/COMMENTS

                        DURING THE FIRST OF MARCH THE FGD SYSTEM WAS OFF LINE FOR A SCHEDULED
                        OVERHAUL.

                        THE FGD UNIT WAS FORCED OUT OF SERVICE ONCE TO REPAIR THE VENTURI PUMP
                        AND SIX OTHER TIMES DUE TO LOW VENTURI FLOW.

 4/80  SYSTEM      97.3        96.4        96.8        82.7                 720    618   596

      ** PROBLEMS/SOLUTIONS/COMMENTS

                        LEAKS IN THE VENTURI LINE FORCED THE FGD SYSTEM OUT OF SERICE TWICE
                        DURING APRIL.
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NEVADA POWER: REID GARDNER 1 (CONT.)

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---------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------
                                     A THERMOCOUPLE SHORTED OUT DUE TO HIGH VENTURI GAS OUTLET TEMPERATURES.
                                     THIS FORCED THE FGD SYSTEM OUT OF SERVICE FOR SEVERAL HOURS.

                                     THE BOILER WAS OUT OF SERVICE FOR 117 HOURS DUE TO BOILER TUBE LEAKS.
 5/80  SYSTEM       97.7         93.9         97.4         84.7                        744    672    630

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE FGD SYSTEM WAS DOWN THREE TIMES IN MAY BECAUSE OF LOW FLOW THROUGH THE
                                     VENTURI.

                                     A BOILER TRIP CAUSED THE FGD SYSTEM TO BE OUT APPROXIMATELY 97 HOURS.
 6/80  SYSTEM       92.1         92.7         92.7         88.3                        720    686    636

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE NOZZLES IN THE VENTURI RACE TRACK HAD TO BE CLEANED SEVERAL TIMES THIS
                                     MONTH.  TOTAL OUTAGE FOR THIS WAS APPROXIMATELY 48 HOURS.

                                     THE FGD SYSTEM WAS FORCED OUT OF SERVICE WHEN THE EMERGENCY SPRAY SYSTEM
                                     FAILED.

                                     THE FGD SYSTEM WAS OUT OF SERVICE TWICE DURING JUNE DUE TO BOILER OUTAGES.
 7/80  SYSTEM       87.1         94.9         86.7         84.0                        744    658    625

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE FGD SYSTEM WAS RETURNED TO SERVICE ON JULY 3, 1980 AFTER THE BOILER
                                     TRIPPED THE SYSTEM OFF LINE.  THE GUILLOTINE DAMPER HAD TO BE REPAIRED
                                     BEFORE THE FGD SYSTEM COULD RETURN TO SERVICE.

                                     THE FGD SYSTEM WAS OFF LINE FOR SEVERAL HOURS TO UNPLUG THE VENTURI TRAY
                                     AND RACETRACK.  MAINTENANCE WORK WAS ALSO DONE ON THE VENTURI LINE.

                                     A SCHEDULED BOILER OUTAGE CAUSED THE FGD SYSTEM TO BE OFF LINE FOR ONE
                                     DAY.

                                     THE FGD SYSTEM WAS FORCED OUT OF SERVICE WHEN THE EMERGENCY SPRAY SYSTEM
                                     FAILED.  THE ASH SLUICE PUMP SHAFT WAS REPAIRED DURING THIS TIME.
 8/80  SYSTEM       86.1         85.5         83.7         71.5                        744    622    532

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE FGD SYSTEM WAS OUT OF SERVICE FOR ALMOST 60 HOURS FOR ROUTINE CLEANING
                                     AND MAINTENANCE.

                                     LOSS OF EMERGENCY SPRAY KEPT THE FGD SYSTEM OFF LINE FOR SEVERAL HOURS.

                                     BOILER RELATED OUTAGES CAUSED THE FGD SYSTEM NOT TO OPERATE FOR OVER 100
                                     HOURS.

                                     THE TRAY SPRAY PUMP BELTS WERE REPAIRED.

                                     A DAMPER THAT FAILED TO CLOSE TRIPPED THE FGD SYSTEM OFF LINE DURING THE
                                     MONTH.
 9/80  SYSTEM       91.3         91.0         91.1         89.6                        720    709    645

        ** PROBLEMS/SOLUTIONS/COMMENTS

                                     THE FGD SYSTEM WENT OFF LINE SEVERAL TIMES IN SEPTEMBER FOR ROUTINE CLEAN-
                                     ING AND MAINTENANCE.  THIS ROUTINE WORK INCLUDED CLEANING THE TRAYS AND
                                     REPAIRING VENTURI, ASH, AND EFFLUENT LINES.
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NEVADA POWER: REID GARDNER 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

A BOILER OUTAGE KEPT THE FGD SYSTEM OFF LINE FOR SEVERAL HOURS.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NEVADA POWER	
PLANT NAME	REID GARDNER	
UNIT NUMBER	2	
CITY	MOAPA	
STATE	NEVADA	
GROSS UNIT GENERATING CAPACITY - MW	125.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	110.0	
EQUIVALENT SCRUBBED CAPACITY - MW	125.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	28959.	(12450 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	5.50	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	SODIUM CARBONATE	
SYSTEM SUPPLIER	COMBUSTION EQUIP ASSOCIATES	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/74	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	97.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	9.8	(155 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	97.4	94.5	96.9	81.6			744	642	607	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SCRUBBER WENT OFF LINE WITH THE BOILER TO REPLACE THE REBUILT BOILER HIGH PRESSURE HEATER. THIS OUTAGE LASTED APPROXIMATELY 112 HOURS.

REPAIRS WERE NEEDED ON THE LEFT HAND INTERCEPT VALVE ON THE TURBINE CAUSING THE SCRUBBER TO COME OFF LINE WITH THE BOILER.

THE CLEANING OF THE VENTURI RACE TRACK NOZZLES CAUSED TWO SCRUBBER OUTAGES.

THE SCRUBBER WENT OFF LINE SO MAINTENANCE COULD BE PERFORMED ON THE ID FAN DAMPER CONTROLS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	96.9	96.9	96.9	96.9			696	696	675	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER WAS TAKEN OFF-LINE TWICE DURING FEBRUARY DUE TO A MALFUNCTION OF THE ID FAN CONTROLS. THE PRESSURE SENSING LINES WERE ALSO CLEANED DURING THE OUTAGE.

THE SCRUBBER RACE TRACK NOZZLES HAD TO BE CLEANED TWICE, CAUSING APPROXIMATELY 4 HOURS OUTAGE TIME.

THE DISCHARGE VALVE ON THE VENTURI RECYCLE PUMP WAS REPLACED DURING FEBRUARY.

NEVADA POWER: REID GARDNER 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS  FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

                              REPAIRS WERE MADE ON THE SCRUBBER EMERGENCY SPRAY LINE CAUSING ABOUT 4
                              HOURS OUTAGE TIME.

                              THE SCRUBBER HAD TO BE SHUT DOWN SO REPAIRS ON THE ID FAN DAMPER CONTROLS
                              COULD BE MADE.

 3/80  SYSTEM     98.4         97.5        97.5        97.5                     744   744    725

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              DURING MARCH THE SCRUBBER WAS TAKEN OFF LINE DUE TO THE UNAVAILABILITY OF
                              THE EMERGENCY SPRAY SYSTEM.  DURING THIS TIME MAINTENANCE WAS DONE ON THE
                              A AND B ASH SLUICE PUMPS.

                              LATER IN THE MONTH AN OUTAGE WAS CAUSED BY A LEAK IN THE EMERGENCY SPRAY
                              LINE.

                              LOW VENTURI FLOW ALSO WAS A PROBLEM DURING MARCH.

 4/80  SYSTEM     99.0         99.0        99.0        93.5                     720   680    673

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE FGD SYSTEM WAS UNAVAILABLE FOR 7 HOURS TO UNPLUG THE VENTURI RACE
                              TRACK.

                              THE BOILER WAS OUT OF SERVICE FOR 40 HOURS DUE TO BOILER TUBE LEAKS.

 5/80  SYSTEM    100.0         86.3          .0        14.3                     744   124    107

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE FGD OVERHAUL WAS COMPLETED EARLY IN MAY.

                              A BOILER OVERHAUL WAS STARTED AND COMPLETED DURING MAY.  THIS OUTAGE LASTED
                              ALMOST 23 DAYS.

 6/80  SYSTEM     99.6         97.5        99.5        73.4                     720   541    528

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE BOILER WAS OUT OF SERVICE SEVERAL TIMES DURING JUNE.  THIS CAUSED THE
                              FGD SYSTEM TO BE OUT APPROXIMATELY 80 HOURS.

                              VENTURI RACE TRACK NOZZLES NEEDED TO BE UNPLUGGED CAUSING THE FGD SYSTEM
                              OUT OF SERVICE FOR SEVERAL HOURS.

 7/80  SYSTEM     88.1         77.2        86.2        74.5                     744   718    554

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              BOILER RELATED OUTAGES KEPT THE FGD SYSTEM OUT OF SERVICE FOR OVER 100
                              HOURS DURING JUNE.  OVER HALF OF THIS OUTAGE TIME WAS A RESULT OF CONTROL
                              PROBLEMS WITH THE BOILER AND FGD SYSTEM.  THE BOILER WAS RUN WITHOUT THE
                              FGD SYSTEM IN ORDER TO DETERMINE IF THE CONTROL PROBLEMS WERE FGD OR BOILER
                              RELATED.  PROBLEMS WERE REPAIRED IN BOTH CONTROL SYSTEMS.  THIS ALSO CAUSED
                              OVER 60 HOURS OF FGD SYSTEM RELATED DOWN TIME.

                              PROBLEMS WITH THE BOTTOM HOPPER SEALS CAUSED THE FGD SYSTEM TO GO DOWN.

                              THE FGD SYSTEM NEEDED TO BE OFF LINE FOR 13 HOURS FOR INSTRUMENT CHECKS
                              AND MAINTENANCE.

                              THE FGD SYSTEM WAS FORCED OUT OF SERVICE WHEN THE EMERGENCY SPRAY SYSTEM
                              FAILED.  THE ASH SLUICE PUMP SHAFT WAS REPAIRED DURING THIS TIME.

 8/80  SYSTEM     97.0         96.3        96.4        79.7                     744   613    591
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NEVADA POWER: REID GARDNER 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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       ** PROBLEMS/SOLUTIONS/COMMENTS

                      LOSS OF EMERGENCY SPRAY KEPT THE FGD SYSTEM OFF LINE FOR ALMOST 20 HOURS.

                      BOILER RELATED OUTAGES CAUSED THE FGD SYSTEM NOT TO OPERATE FOR OVER 130
                      HOURS.

 9/80  SYSTEM     100.0                                       .0                 720     0      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                      THE FGD SYSTEM WAS 100% AVAILABLE DURING A SCHEDULED BOILER OVERHAUL IN
                      SEPTEMBER.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NEVADA POWER	
PLANT NAME	REID GARDNER	
UNIT NUMBER	3	
CITY	MOAPA	
STATE	NEVADA	
GROSS UNIT GENERATING CAPACITY - MW	125.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	110.0	
EQUIVALENT SCRUBBED CAPACITY - MW	125.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	28959.	(12450 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	9.00	
AVERAGE SULFUR CONTENT - %	.50	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	SODIUM CARBONATE	
SYSTEM SUPPLIER	COMBUSTION EQUIP ASSOCIATES	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	6/76	
COMMERCIAL START-UP DATE	7/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	9.8	(155 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0	99.8	100.0	91.4			744	681	680	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SCRUBBER AND BOILER WERE OFF LINE FOR APPROXIMATELY 64 HOURS TO REPAIR AND BALANCE THE BOILER ID FAN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	100.0	98.1	100.0	77.9			696	552	542	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY TWO OUTAGES WERE NECESSARY SO THE ID FAN COULD BE BALANCED.

THE SCRUBBER AND BOILER WENT OFF LINE SO THAT THE COAL LEAKS ON THE BURNER LINES COULD BE REPAIRED.

HIGH FURNACE PRESSURE CAUSED THE SCRUBBER AND BOILER TO TRIP OFF.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	100.0	99.6	100.0	60.3			744	450	448	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT AND SCRUBBER WENT DOWN TWICE DURING MARCH. THE FIRST OUTAGE WAS TO BALANCE THE ID FAN. LATER IN THE MONTH THE ID FANS AND THE PRECIPITATORS HAD TO BE REPAIRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0			.0			720	0	0	

NEVADA POWER: REID GARDNER 3 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               THE FGD SYSTEM WAS AVAILABLE 100% DURING APRIL, HOWEVER, DID NOT OPERATE
                               DUE TO THE OVERHAUL OF BOTH THE DUST COLLECTOR AND THE ID FAN.

 5/80  SYSTEM       .0          .0          .0          .0                     744   462     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               THE FGD SYSTEM WAS DOWN THE ENTIRE MONTH FOR THE OVERHAUL OF THE FGD ID
                               FANS.  BECAUSE OF THIS, THE SYSTEM AVAILABILITY WAS ZERO FOR MAY.

 6/80  SYSTEM     75.2        81.4        81.4        72.2                     720   639   520

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               THE ID FAN OVERHAUL WAS COMPLETED EARLY IN JUNE.

                               THE BOILER WAS OUT OF SERVICE FOR 21 HOURS.

 7/80  SYSTEM     95.7        96.4        95.7        95.2                     744   735   721

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               BOILER RELATED OUTAGES KEPT THE FGD SYSTEM OFF LINE FOR SEVERAL HOURS.

                               A HIGH VENTURI OUTLET TEMPERATURE FORCED THE FGD SYSTEM OFF LINE DURING
                               PART OF JULY.

                               A HIGH VENTURI OUTLET TEMPERATURE FORCED THE FGD SYSTEM OFF LINE DURING

 8/80  SYSTEM    100.0       100.0       100.0       100.0                     744   744   744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               THE FGD SYSTEM WAS AVAILABLE DURING ALL OF AUGUST.

 9/80  SYSTEM     96.8        96.8        96.8        96.8                     720   720   697

       ** PROBLEMS/SOLUTIONS/COMMENTS

                               THE FGD SYSTEM WAS OUT OF SERVICE IN SEPTEMBER BECAUSE OF ROUTINE CLEANING
                               AND MAINTENANCE.
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                                        SECTION 3
                  DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                      NORTHERN INDIANA PUB SERVICE
PLANT NAME                                        DEAN H. MITCHELL
UNIT NUMBER                                       11
CITY                                              GARY
STATE                                             INDIANA
GROSS UNIT GENERATING CAPACITY - MW                 116.0
NET UNIT GENERATING CAPACITY W/FGD - MW              94.0
EQUIVALENT SCRUBBED CAPACITY - MW                   115.0

** FUEL DATA
    FUEL TYPE                                     COAL
    FUEL GRADE                                    ******
    AVERAGE HEAT CONTENT - J/G                     25586.       ( 11000 BTU/LB)
    AVERAGE ASH CONTENT - %                       ********
    AVERAGE MOISTURE CONTENT - %                     11.00
    AVERAGE SULFUR CONTENT - %                        3.50
    AVERAGE CHLORIDE CONTENT - %                  ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                          WET SCRUBBING
    PROCESS TYPE                                  WELLMAN LORD
    SYSTEM SUPPLIER                               DAVY MCKEE
    NEW/RETROFIT                                  RETROFIT
    ENERGY CONSUMPTION - %                          12.1
    INITIAL START-UP DATE                         7/76
    COMMERCIAL START-UP DATE                      6/77
    SO2 DESIGN REMOVAL EFFICIENCY - %                90.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %        98.50
    ABSORBER SPARE CAPACITY INDEX - %                  .0
    ABSORBER SPARE COMPONENTS INDEX                    .0

** WATER LOOP
    TYPE                                          CLOSED
    FRESH MAKE-UP WATER - LITER/S                 *******          (***** GPM)

** BYPRODUCT
    BYPRODUCT NATURE                              ELEMENTAL SULFUR
    DISPOSITION


------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

12/79  SYSTEM        .0                                   .0                744     0      0     .0

      ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE TURNAROUND ON UNIT 11 WAS COMPLETED ON DECEMBER 14, HOWEVER, THE STEAM
                          SUPPLY TO THE REGENERATION FACILITY WAS NOT AVAILABLE IN DECEMBER.  THE
                          FGD SYSTEM DID NOT OPERATE THE ENTIRE MONTH.
 1/80  SYSTEM      17.3                                   .0                744     0      0     .0

      ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE STEAM SUPPLY TO THE REGENERATION FACILITY WAS MADE AVAILABLE ON
                          JANUARY 15.  THE FGD SYSTEM WAS OPERATIONAL ON JANUARY 22 AFTER THE
                          OVERHAUL OF THE BOOSTER BLOWER DRIVE WAS COMPLETED.

                          THE REGENERATION FACILITY WAS FORCED OUT SEVERAL TIMES DUE TO PROBLEMS
                          WITH THE CONDENSATE RETURN.
 2/80  SYSTEM      46.3        27.0        26.5        23.3                 696   600    162

      ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE BOILER WAS SHUT DOWN ON FEBRUARY 27 DUE TO A HYDROGEN LEAK.

                          THE FGD SYSTEM WAS FORCED OUT DUE TO CONTINUED PROBLEMS WITH THE CONDENSATE
                          RETURN.  GAS LEAKS IN THE FLUE AND VESSEL SHELL IN THE SO2 REDUCTION UNIT
                          ALSO CAUSED THE SYSTEM TO GO DOWN.
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NORTHERN INDIANA PUB SERVICE: DEAN H. MITCHELL 11 (CONT.)

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------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 3/80  SYSTEM      75.4        20.4        24.9        14.5                  744   529    108

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    THE BOILER WAS OPERATIONAL ON MARCH 1 AFTER THE HYDROGEN LEAKS WERE
                    REPAIRED.  THE BOILER WAS DOWN FROM MARCH 18 TO 23 SO THAT THE TURBINE
                    STOP VALVES COULD BE PULLED AND THE HYDROGEN SEALS COULD BE INSPECTED.

                    THE FGD SYSTEM WAS FORCED OUT OF SERVICE WHEN A COMPRESSOR FAILED AND
                    AGAIN LATER AFTER AN INSTRUMENT MALFUNCTION.  THERE WAS A COMPLETE POWER
                    IN THE FGD AREA WHICH FORCED THE SYSTEM DOWN FROM MARCH 26 THROUGH 27.

 4/80  SYSTEM      63.3        52.6        53.4        50.3                  720   702    362

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    FGD SYSTEM OPERATIONS DURING APRIL WERE INTERRUPTED BY SULFUR ACCUMULA-
                    TION AND BLOCKAGE IN THE CLAUS CONVERTER UNIT.

 5/80  SYSTEM      62.8        23.5        26.4        15.5                  744   490    115

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    THE FGD SYSTEM REGENERATION FACILITY EXPERIENCED A DRIVE MOTOR FAILURE ON
                    THE EVAPORATOR CIRCULATING PUMP DURING MAY.

 6/80  SYSTEM      53.3          .0          .0          .0                  720   211      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    THE BOILER WAS OFF LINE MOST OF JUNE DUE TO LOW SYSTEM POWER DEMAND.

                    THE AVAILABILITY OF THE FGD SYSTEM WAS LIMITED BY PROBLEMS WITH THE
                    BOOSTER BLOWER DRIVE AND LOOSENING OF A SUPPORT BEAM IN THE ABSORBER.

 7/80  SYSTEM     100.0          .0                      .0                  744   331      0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    THE BOILER OPERATED ON LOW SULFUR COAL DURING JULY.  THE BOILER WAS OFF
                    LINE FOR APPROXIMATELY 17 DAYS DUE TO LOW SYSTEM POWER DEMAND.

 8/80  SYSTEM      53.9        65.6        65.6        31.0                  744   352    231

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    FROM AUGUST 1 TO AUGUST 13 THE BOILER FIRED LOW SULFUR COAL OR WAS
                    OPERATED AT LOW LOAD.  FGD SYSTEM OPERATION WAS NOT NECESSARY DURING THIS
                    TIME.

                    FROM AUGUST 14 TO AUGUST 31, HIGH SULFUR COAL WAS FIRED MAKING FGD
                    SYSTEM OPERATION NECESSARY.  PROBLEMS WITH THE BOOSTER BLOWER WERE
                    ENCOUNTERED WHEN THE UTILITY ATTEMPTED TO BRING THE SYSTEM ON LINE.  THE
                    BLOWER EXPERIENCED LOW OIL PRESSURE CAUSING THE SYSTEM NOT TO BE OPERABLE
                    UNTIL AUGUST 19.

 9/80  SYSTEM      65.6        53.1        53.1        45.1                  720   612    325

       ** PROBLEMS/SOLUTIONS/COMMENTS

                    THE BOOSTER BLOWER BEARING AND GOVERNOR REPAIRS ACCOUNTED FOR SOME OUTAGE
                    TIME DURING SEPTEMBER.

                    THE SULFUR CONDENSERS IN THE SO2 REDUCTION UNIT WERE AN ADDITIONAL PROBLEM
                    DURING SEPTEMBER.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	NORTHERN STATES POWER
PLANT NAME	SHERBURNE
UNIT NUMBER	1
CITY	BECKER
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	740.0
NET UNIT GENERATING CAPACITY W/FGD - MW	700.0
EQUIVALENT SCRUBBED CAPACITY - MW	740.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19771. (8500 BTU/LB)
AVERAGE ASH CONTENT - %	9.00
AVERAGE MOISTURE CONTENT - %	25.00
AVERAGE SULFUR CONTENT - %	.80
AVERAGE CHLORIDE CONTENT - %	.03
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE/ALKALINE FLYASH
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	2.7
INITIAL START-UP DATE	3/76
COMMERCIAL START-UP DATE	5/76
SO2 DESIGN REMOVAL EFFICIENCY - %	50.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	9.0
ABSORBER SPARE COMPONENTS INDEX	1.0
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** TREATMENT	
TYPE	FORCED OXIDATION
** DISPOSAL	
TYPE	LINED POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	97.0						744	793		90.8
2/80	SYSTEM	97.0						696	687		66.2
3/80	SYSTEM	98.0						744	688		84.1

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980 NO MAJOR PROBLEMS WERE ENCOUNTERED WITH THE FGD SYSTEM.

FROM MID-SEPTEMBER TO MID-OCTOBER THE UTILITY HAS SCHEDULED A BOILER OUTAGE AT WHICH TIME THE MARBLE BEDS WILL BE INSPECTED.

THE UTILITY HAS DECIDED TO CONVERT THE ENTIRE MARBLE BED SCRUBBING SYSTEM TO A SPRAY TOWER SYSTEM BY REMOVING THE MARBLE BEDS AND MODIFYING THE SPRAY ARRANGEMENT. TESTS CONDUCTED IN 1978 AND 1979 SHOW THAT MOST OF THE SO2 IS COLLECTED IN THE VENTURI SECTION OF THE SCRUBBING TRAINS AND THAT ALTHOUGH THE MARBLE BEDS IN THE ABSORBER SECTIONS IMPROVE INTIMATE SO2/ SLURRY MIXING SO2 REMOVAL EFFICIENCY OF THE SCRUBBING TRAINS IS NOT MARKEDLY DIFFERENT WHEN MARBLE BEDS ARE REMOVED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	97.0						720	720		79.4
5/80	SYSTEM	96.0						744	720		78.1
6/80	SYSTEM	96.0						720	697		74.7

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                                      EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980
NORTHERN STATES POWER: SHERBURNE 1 (CONT.)


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED DURING THE SECOND QUARTER
                         OF 1980.

 7/80  SYSTEM     100.0        100.0       100.0       100.0                744   744    744  82.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         NO OPERATIONAL PROBLEMS WERE ENCOUNTERED IN JULY.

 8/80  SYSTEM     100.0        100.0       100.0        99.2                744   738    738  69.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THERE WERE TWO SHORT TERM OUTAGES IN JULY DUE TO BOILER RELATED TRIPS.

 9/80  SYSTEM     100.0        100.0       100.0        99.6                720   717    717  76.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         A BOILER RELATED PROBLEM CAUSED THE ONLY OUTAGE TIME IN SEPTEMBER.
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                                              SECTION 3
                        DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                               NORTHERN STATES POWER
PLANT NAME                                                 SHERBURNE
UNIT NUMBER                                                2
CITY                                                       BECKER
STATE                                                      MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW                          740.0
NET UNIT GENERATING CAPACITY W/FGD - MW                      700.0
EQUIVALENT SCRUBBED CAPACITY - MW                            740.0

** FUEL DATA
    FUEL TYPE                                              COAL
    FUEL GRADE                                             SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                              19771.        (  8500 BTU/LB)
    AVERAGE ASH CONTENT - %                                    9.00
    AVERAGE MOISTURE CONTENT - %                              25.00
    AVERAGE SULFUR CONTENT - %                                  .80
    AVERAGE CHLORIDE CONTENT - %                                .03

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                                   WET SCRUBBING
    PROCESS TYPE                                           LIMESTONE/ALKALINE FLYASH
    SYSTEM SUPPLIER                                        COMBUSTION ENGINEERING
    NEW/RETROFIT                                           NEW
    ENERGY CONSUMPTION - %                                     2.7
    INITIAL START-UP DATE                                   3/77
    COMMERCIAL START-UP DATE                                4/77
    SO2 DESIGN REMOVAL EFFICIENCY - %                         50.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %                 99.00
    ABSORBER SPARE CAPACITY INDEX - %                          9.0
    ABSORBER SPARE COMPONENTS INDEX                            1.0

** WATER LOOP
    TYPE                                                   OPEN
    FRESH MAKE-UP WATER - LITER/S                          *******         (***** GPM)

** TREATMENT
    TYPE                                                   FORCED OXIDATION

** DISPOSAL
    TYPE                                                   LINED POND


-----------------------------------------PERFORMANCE DATA------------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM      97.0
                                                                            744   744          90.1
 2/80  SYSTEM      96.0
                                                                            696   696          91.8
 3/80  SYSTEM      98.0
                                                                            744   744          91.9
      ** PROBLEMS/SOLUTIONS/COMMENTS

                        DURING THE FIRST QUARTER OF 1980 THE FGD SYSTEM EXPERIENCED NO MAJOR
                        PROBLEMS.

                        A FOUR WEEK BOILER OUTAGE IS SCHEDULED FOR MAY AT WHICH TIME THE MARBLE
                        BEDS WILL BE REMOVED FROM THE FGD SYSTEM.

                        THE UTILITY HAS DECIDED TO CONVERT THE ENTIRE MARBLE BED SCRUBBING SYSTEM
                        TO A SPRAY TOWER SYSTEM BY REMOVING THE MARBLE BEDS AND MODIFYING THE SPRAY
                        ARRANGEMENT.  TESTS CONDUCTED AT UNIT 1 IN 1978 AND 1979 SHOW THAT MOST OF
                        THE SO2 IS COLLECTED IN THE VENTURI SECTION OF THE SCRUBBING TRAINS AND
                        THAT ALTHOUGH THE MARBLE BEDS IN THE ABSORBER SECTIONS IMPROVE INTIMATE
                        SO2/SLURRY MIXING SO2 REMOVAL EFFICIENCY OF THE SCRUBBING TRAINS IS NOT
                        MARKEDLY DIFFERENT WHEN MARBLE BEDS ARE REMOVED.
 4/80  SYSTEM      96.0
                                                                            720   704          68.6
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NORTHERN STATES POWER: SHERBURNE 2 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        NO MAJOR OPERATIONAL PROBLEMS WERE ENCOUNTERED IN APRIL.

 5/80  SYSTEM      96.0                                                     744   214          24.2

 6/80  SYSTEM     100.0                                                     720    51           2.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE FGD SYSTEM WAS OUT OF SERIVE MOST OF MAY AND JUNE BECAUSE OF THE ANNUAL
                        BOILER AND TURBINE INSPECTION.

 7/80  SYSTEM     100.0        100.0       100.0        82.7                744   615    615   63.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        BOILER TUBE LEAKS CAUSED THE BOILER NOT TO OPERATE FOR 73 HOURS IN JULY.

                        BOTTOM ASH PLUGGING ALSO FORCED THE BOILER DOWN FOR 56 HOURS.

 8/80  SYSTEM     100.0        100.0       100.0       100.0                744   744    744   70.7

 9/80  SYSTEM     100.0        100.0       100.0       100.0                720   720    720  100.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE BOILER AND FGD SYSTEM RAN CONTINUOUSLY THROUGH AUGUST AND SEPTEMBER
                        WITHOUT ANY PROBLEMS.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PACIFIC POWER & LIGHT
PLANT NAME	JIM BRIDGER
UNIT NUMBER	4
CITY	ROCK SPRINGS
STATE	WYOMING
GROSS UNIT GENERATING CAPACITY - MW	550.0
NET UNIT GENERATING CAPACITY W/FGD - MW	507.8
EQUIVALENT SCRUBBED CAPACITY - MW	550.0

** FUEL DATA

FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	21632.	(9300 BTU/LB)
AVERAGE ASH CONTENT - %	9.00	
AVERAGE MOISTURE CONTENT - %	18.00	
AVERAGE SULFUR CONTENT - %	.56	
AVERAGE CHLORIDE CONTENT - %	.01	

** GENERAL EMISSION CONTROL SYSTEM DATA

GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	SODIUM CARBONATE
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	.2
INITIAL START-UP DATE	9/79
COMMERCIAL START-UP DATE	2/80
SO2 DESIGN REMOVAL EFFICIENCY - %	91.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.00
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0

** WATER LOOP

TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)

** DISPOSAL

TYPE	LINED POND

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT IS STILL IN THE SHAKEDOWN PHASE OF OPERATIONS. A NUMBER OF MECHANICAL PROBLEMS AND SOME CONTROL PROBLEMS HAVE BEEN ENCOUNTERED. NO PROCESS-RELATED PROBLEMS HAVE OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	41	27.5	18.4	22.3	14.2						
	42	24.0	23.9	26.3	18.4						
	43	26.6	34.0	34.2	26.1						
	SYSTEM	26.0	25.4	27.6	19.6			720	553	141	

** PROBLEMS/SOLUTIONS/COMMENTS

ALL THREE MODULES WERE OUT OF SERVICE THE FIRST 21 DAYS OF APRIL WHILE THE UTILITY WAITED FOR DELIVERY OF NEW SPRAY NOZZLES. SOME PLUGGING HAD OCCURRED IN THE ORIGINAL NOZZLES. THE NEW NOZZLES WERE INSTALLED FOR TESTING PURPOSES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	41	95.2	46.0	92.6	42.9						
	42	72.4	75.1	71.7	70.1						
	43	100.0	81.6	100.0	76.1						
	SYSTEM	89.2	67.6	88.1	63.8			744	694	469	

PACIFIC POWER & LIGHT: JIM BRIDGER 4 (CONT.)

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------------------------------------------PERFORMANCE DATA----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     MODULE 42 WAS FORCED OUT OF SERVICE FOR EIGHT DAYS IN MAY WHILE A VORTEX
                     BREAKER WAS INSTALLED IN THE ABSORBER VESSEL.  THE VESSEL WAS DRAINING
                     BEFORE REACHING DESIGN FLUID LEVELS.

                     VORTEX BREAKERS WERE INSTALLED IN MODULES 41 AND 43 AS WELL BUT INSTALLA-
                     TION IN THESE MODULES WAS NOT UNDERTAKEN DURING PERIODS WHEN MODULE SERVICE
                     WAS REQUIRED.

 6/80  41          81.2         77.7        66.5        30.9
       42          89.2        100.0        85.1        43.2
       43          86.0         75.0        73.6        29.8
       SYSTEM      85.5         87.1        75.4        34.6                     744   296    258

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     THE FGD SYSTEM WAS DOWN FOR 5 DAYS TO REPAIR A RECIRCULATION PUMP BREAKER
                     ON MODULE 41.

                     MODULES 41 AND 42 WERE UNAVAILABLE FOR A COMBINED TOTAL OF 6 DAYS DUE TO
                     THE REPLACING OF THE PH CONTROL PIPING.

 7/80  41          97.3         67.2        96.0        64.8
       42          97.4         91.2        97.1        87.8
       43          99.4         90.2        99.3        86.9
       SYSTEM      98.0         82.9        97.6        79.8                     744   717    594

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED IN JULY.

 8/80  41          99.7         92.8        99.7        86.1
       42          94.1         92.3        93.6        85.6
       43          94.7         68.4        92.4        63.5
       SYSTEM      96.2         84.5        95.2        78.4                     744   690    583

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     NO FGD RELATED PROBLEMS WERE REPORTED FOR THE MONTH OF AUGUST.

                                                                                 720
 9/80  SYSTEM

       ** PROBLEMS/SOLUTIONS/COMMENTS

                     NO INFORMATION WAS AVAILABLE FOR SEPTEMBER 1980.
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SECTION 3

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PENNSYLVANIA POWER	
PLANT NAME	BRUCE MANSFIELD	
UNIT NUMBER	1	
CITY	SHIPPINGPORT	
STATE	PENNSYLVANIA	
GROSS UNIT GENERATING CAPACITY - MW	917.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	825.0	
EQUIVALENT SCRUBBED CAPACITY - MW	917.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	12.90	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	3.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	6.0	
INITIAL START-UP DATE	12/75	
COMMERCIAL START-UP DATE	6/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	92.10	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.80	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	CALCILOX	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	98.6	100.0		90.4			744	672	672	
2/80	SYSTEM	98.1	100.0		93.7			696	652	652	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS OCCURRED DURING JANUARY AND FEBRUARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	98.8	100.0		83.7			744	623	623	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE ONE WEEK IN MARCH DUE TO A PLUGGED AIR PREHEATER. NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED FOR MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			

PENNSYLVANIA POWER: BRUCE MANSFIELD 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.

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EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

                                   SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
------------------------------------------------------------------------------------------------

COMPANY NAME                                     PENNSYLVANIA POWER
PLANT NAME                                       BRUCE MANSFIELD
UNIT NUMBER                                      2
CITY                                             SHIPPINGPORT
STATE                                            PENNSYLVANIA
GROSS UNIT GENERATING CAPACITY - MW                917.0
NET UNIT GENERATING CAPACITY W/FGD - MW            825.0
EQUIVALENT SCRUBBED CAPACITY - MW                  917.0

** FUEL DATA
    FUEL TYPE                                    COAL
    FUEL GRADE                                   BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                    26749.        ( 11500 BTU/LB)
    AVERAGE ASH CONTENT - %                          12.90
    AVERAGE MOISTURE CONTENT - %                      7.00
    AVERAGE SULFUR CONTENT - %                        3.00
    AVERAGE CHLORIDE CONTENT - %                 ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                         WET SCRUBBING
    PROCESS TYPE                                 LIME
    SYSTEM SUPPLIER                              CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                 NEW
    ENERGY CONSUMPTION - %                          6.0
    INITIAL START-UP DATE                         7/77
    COMMERCIAL START-UP DATE                     10/77
    SO2 DESIGN REMOVAL EFFICIENCY - %               92.10
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.80
    ABSORBER SPARE CAPACITY INDEX - %                 .0
    ABSORBER SPARE COMPONENTS INDEX                   .0

** WATER LOOP
    TYPE                                         OPEN
    FRESH MAKE-UP WATER - LITER/S                *******        (***** GPM)

** TREATMENT
    TYPE                                         CALCILOX

** DISPOSAL
    TYPE                                         LANDFILL

-------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ---- ----- ----- ------ ----- ------
 1/80  SYSTEM     97.1        100.0                   90.6                  744   674    674

 2/80  SYSTEM     94.7        100.0                   99.8                  696   694    694

        ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE FGD SYSTEM EXPERIENCED NO MAJOR PROBLEMS DURING JANUARY AND FEBRUARY.

 3/80  SYSTEM     98.4        100.0                   51.1                  744   380    380

        ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE BOILER WAS OUT OF SERVICE 16 DAYS IN MARCH FOR A SCHEDULED BOILER
                       INSPECTION.  NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED.

 4/80  SYSTEM                                                               720

 5/80  SYSTEM                                                               744

 6/80  SYSTEM                                                               720

        ** PROBLEMS/SOLUTIONS/COMMENTS

                       INFORMATION FOR THE APRIL THROUGH JUNE PERIOD WAS NOT AVAILABLE.

 7/80  SYSTEM                                                               744
```

PENNSYLVANIA POWER: BRUCE MANSFIELD 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.

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                                           SECTION 3
              DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                    PENNSYLVANIA POWER
PLANT NAME                                      BRUCE MANSFIELD
UNIT NUMBER                                     3
CITY                                            SHIPPINGPORT
STATE                                           PENNSYLVANIA
REGULATORY CLASSIFICATION                       D
PARTICULATE EMISSION LIMITATION - NG/J            32.          (  .075 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                   258.          (  .600 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW              2751.0
GROSS UNIT GENERATING CAPACITY - MW              917.0
NET UNIT GENERATING CAPACITY W/FGD - MW          825.0
NET UNIT GENERATING CAPACITY WO/FGD - MW        *******
EQUIVALENT SCRUBBED CAPACITY - MW                917.0

** BOILER DATA
    SUPPLIER                                    FOSTER WHEELER
    TYPE                                        PULVERIZED COAL
    SERVICE LOAD                                BASE
    COMMERCIAL SERVICE DATE                     **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S        1561.05       (3308000 ACFM)
    FLUE GAS TEMPERATURE - C                      140.6        ( 285 F)
    STACK HEIGHT - M                              183.         ( 600 FT)
    STACK TOP DIAMETER - M                      *******        (***** FT)

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  ******
    AVERAGE HEAT CONTENT - J/G                   26749.        ( 11500 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                 11.500-11,950
    AVERAGE ASH CONTENT - %                         12.50
    RANGE ASH CONTENT - %                       11.5-13.5
    AVERAGE MOISTURE CONTENT - %                     7.00
    RANGE MOISTURE CONTENT - %                  5.5-8.5
    AVERAGE SULFUR CONTENT - %                       3.00
    RANGE SULFUR CONTENT - %                    1.75-3.75
    AVERAGE CHLORIDE CONTENT - %                ********
    RANGE CHLORIDE CONTENT - %                  ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT          THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIME
    PROCESS ADDITIVES                           MG PROMOTED
    SYSTEM SUPPLIER                             PULLMAN KELLOGG
    A-E FIRM                                    GILBERT/COMMONWEALTH ASSOCIATES
    DEVELOPMENT LEVEL                           FULL SCALE
    NEW/RETROFIT                                NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %      95.00
    SO2 DESIGN REMOVAL EFFICIENCY - %              92.20
    COMMERCIAL DATE                              6/80
    INITIAL START-UP                             6/80

** ESP
    NUMBER                                       3
    TYPE                                        COLD SIDE

** PARTICLE SCRUBBER
    TYPE                                        NONE

** ABSORBER
    NUMBER                                       4
    TYPE                                        SPRAY TOWER
    INITIAL START UP                             4/80
    SUPPLIER                                    PULLMAN KELLOGG
    NUMBER OF STAGES                               6
    NUMBER OF NOZZLES                            300
    PRESSURE DROP - KPA                             7.0        (28.0 IN-H2O)
    SUPERFICAL GAS VELOCITY - M/SEC                 6.7        ( 22.0 FT/S)
    ABSORBER SPARE CAPACITY INDEX - %               2.5
    ABSORBER SPARE COMPONENT INDEX                  1.0

** FANS
    NUMBER                                       4
    TYPE                                        CENTRIFUGAL RADIAL TIP
```

```
PENNSYLVANIA POWER: BRUCE MANSFIELD 3 (CONT.)

     SERVICE - WET/DRY                               DRY

 ** MIST ELIMINATOR
     TYPE                                            CHEVRON

 ** PUMPS
     SERVICE                                         NUMBER
     -------                                         ------
     SLURRY RECIRCULATION                            ****
     ******                                          ****

 ** TANKS
     SERVICE                                         NUMBER
     -------                                         ------
     REACTION                                        ****
     LIME SLURRY                                     ****

 ** REHEATER
     TYPE                                            NONE

 ** THICKENER
     NUMBER                                           1

 ** TREATMENT
     TYPE                                            FLYASH STABILIZATION


------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ---- ----- ----- ------ ----- ------

 6/80  SYSTEM                                                              720

        ** PROBLEMS/SOLUTIONS/COMMENTS

                        INITIAL OPERATION OF THE FGD SYSTEM COMMENCED ON JUNE 9, 1980.  THE
                        UTILITY REPORTED THAT IT IS PRESENTLY IN THE PROCESS OF DEBUGGING THE
                        SYSTEM.

 7/80  SYSTEM                                                              744

 8/80  SYSTEM                                                              744

 9/80  SYSTEM                                                              720

        ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PUBLIC SERVICE OF NEW MEXICO	
PLANT NAME	SAN JUAN	
UNIT NUMBER	1	
CITY	WATERFLOW	
STATE	NEW MEXICO	
GROSS UNIT GENERATING CAPACITY - MW	361.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	314.0	
EQUIVALENT SCRUBBED CAPACITY - MW	361.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22795.	(9800 BTU/LB)
AVERAGE ASH CONTENT - %	18.00	
AVERAGE MOISTURE CONTENT - %	14.82	
AVERAGE SULFUR CONTENT - %	.80	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	WELLMAN LORD	
SYSTEM SUPPLIER	DAVY MCKEE	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	4.4	
INITIAL START-UP DATE	4/78	
COMMERCIAL START-UP DATE	4/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.80	
ABSORBER SPARE CAPACITY INDEX - %	100.0	
ABSORBER SPARE COMPONENTS INDEX	2.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	30.2	(480 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	ELEMENTAL SULFUR	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	81.0	51.0		41.8						
	B	96.0	42.3		34.7						
	C	.0	.0		.0						
	D	83.0	79.3		65.1						
	SYSTEM	100.0	86.3		70.8			744	610	527	
2/80	A	.0	.0		.0						
	B	99.0	94.3		85.9						
	C	3.0	2.5		2.3						
	D	99.0	97.6		88.9						
	SYSTEM	67.0	97.2		88.6			696	634	616	
3/80	A	.0	.0		.0						
	B	100.0	50.4		17.6						
	C	58.1	82.8		29.2						
	D	97.5	85.5		30.1						
	SYSTEM	100.0	100.0	100.0	38.5			744	262	286	31.0

** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBER OPERATIONS AT UNIT ONE ARE STILL LIMITED TO TWO MODULES BECAUSE OF THE CURRENT LACK OF REHEATER CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	.0	.0		.0						
	B	98.2	71.5		48.2						
	C	50.0	7.2		4.9						
	D	91.7	71.5		48.2						
	SYSTEM	100.0	75.1	100.0	50.7			720	485	365	55.8

PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 1 (CONT.)

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------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             ONLY TWO MODULES ARE NEEDED AT THE PRESENT TIME TO MEET CURRENT SO2
                             EMISSION REGULATIONS (SEE COMMENTS FOR 00/78).

                             A TUBE WALL LEAK FORCED THE BOILER OUT OF SERVICE DURING APRIL.

                             HIGH VIBRATIONS IN THE BOOSTER BLOWER IN MODULE D FOLLOWED AFTER THE UNIT
                             OUTAGE.

                             HIGH VIBRATIONS IN THE BOOSTER BLOWER CAUSED MODULE A TO BE UNAVAILABLE
                             THE ENTIRE MONTH.

                             REPAIR AND MAINTENANCE OF THE BOOSTER BLOWER AND ISOLATION DAMPERS IN
                             MODULE C WERE PERFORMED DURING APRIL.

 5/80  A          73.1        62.1                    55.9
       B          99.7        37.2                    33.5
       C          75.5        71.8                    64.7
       D          80.2        19.9                    17.9
       SYSTEM    100.0        95.5       100.0        86.0                  744   670    640  87.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             BOOSTER BLOWER VIBRATIONS ARE CONTINUING IN ALL THE MODULES.

                             THERE WAS A UNIT OUTAGE SO THAT REPAIR WORK COULD BE UNDERTAKEN ON THE ESP.

 6/80  A           2.8         2.5                     2.1
       B          96.9        92.0                    75.6
       C          82.5        79.2                    65.0
       D            .1          .2                      .1
       SYSTEM     91.2        87.0        79.8        71.4                  720   591    514  65.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             A BOILER TUBE LEAK FORCED THE UNIT OUT OF SERVICE IN JUNE.

                             REPAIR WORK WAS DONE ON THE ISOLATION DAMPERS DURING JUNE.

 7/80  A            .0          .0                      .0
       B          30.4        16.0                    16.0
       C          89.2        87.9                    87.9
       D          82.8        79.6                    79.6
       SYSTEM    100.0        91.7                    91.7                  744   744    683  91.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             MODULE A WAS UNAVAILABLE IN JULY BECAUSE OF REPAIRS MADE TO THE ISOLATION
                             DAMPER AND THE LOWER CHIMNEY SEAL.

                             MODULE B WAS FORCED OUT BECAUSE OF HIGH VIBRATIONS IN THE BOOSTER BLOWER.
                             VIBRATIONAL PROBLEMS ALSO KEPT MODULE D OFF LINE UNTIL JULY 4, WHEN THE
                             BOOSTER BLOWER WAS BALANCED.

 8/80  A            .0          .0                      .0
       B          21.5        21.5                    21.5
       C          91.1        77.8                    77.8
       D          94.4        90.1                    90.1
       SYSTEM    100.0        94.7        93.2        94.7                  744   744    704  82.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             MODULE A DID NOT OPERATE IN AUGUST BECAUSE OF REPAIRS MADE TO THE LOWER
                             CHIMNEY SEAL.

                             MODULE B WAS OUT OF SERVICE FOR OVER 3 WEEKS TO CLEAN, PAINT, AND BALANCE
                             THE BOOSTER BLOWER ROTOR.
```

PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 1 (CONT.)

PERFORMANCE DATA

CRACKED WELDS ON THE WATER INLET NOZZLES WERE REPAIRED ON MODULE C.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	.0	.0		.0						
	B	37.2	57.4		31.4						
	C	39.4	56.1		30.7						
	D	45.1	71.8		39.3						
	SYSTEM	60.9	92.7	94.8	50.7			720	394	365	43.5

** PROBLEMS/SOLUTIONS/COMMENTS

HIGH VIBRATIONS IN THE BOOSTER BLOWER CAUSED MODULE C TO SHUT DOWN FOR PART OF SEPTEMBER.

THE FGD SYSTEM WAS DOWN FOR SEVERAL DAYS BECAUSE OF BOILER RELATED PROBLEMS.

THE BOILER AND FGD SYSTEM WENT DOWN ON SEPTEMBER 18, 1980 FOR SCHEDULED MAINTENANCE AND WERE UNAVAILABLE THE REST OF THE MONTH.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	PUBLIC SERVICE OF NEW MEXICO	
PLANT NAME	SAN JUAN	
UNIT NUMBER	2	
CITY	WATERFLOW	
STATE	NEW MEXICO	
GROSS UNIT GENERATING CAPACITY - MW	350.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	306.0	
EQUIVALENT SCRUBBED CAPACITY - MW	350.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	22795.	(9800 BTU/LB)
AVERAGE ASH CONTENT - %	18.00	
AVERAGE MOISTURE CONTENT - %	14.82	
AVERAGE SULFUR CONTENT - %	.80	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	WELLMAN LORD	
SYSTEM SUPPLIER	DAVY MCKEE	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	4.6	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	8/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	33.0	
ABSORBER SPARE COMPONENTS INDEX	1.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	30.2	(480 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	ELEMENTAL SULFUR	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	E	92.0	63.0		62.4						
	F	100.0	.0		.0						
	G	.0	.0		.0						
	H	.0	.0		.0						
	SYSTEM	96.0	31.5		31.2			744	737	232	

** PROBLEMS/SOLUTIONS/COMMENTS

THE F-MODULE WAS AVAILABLE, HOWEVER, FGD SERVICE WAS NOT REQUIRED BECAUSE A BOILER-RELATED POWER FAILURE FORCED THE BOILER TO OPERATE AT LOW LOAD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	E	97.0	65.7		64.5						
	F	22.0	12.3		12.1						
	G	.0	.0		.0						
	H	.0	.0		.0						
	SYSTEM	59.5	39.0		38.3			696	683	267	
3/80	E	87.0	.0		.0						
	F	85.0	93.6		59.4						
	G	.0	.0		.0						
	H	.0	.0		.0						
	SYSTEM	86.0	46.8		29.7			744	472	221	33.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER ONLY ONE ABSORBER COULD BE OPERATED DUE TO AN ELECTRICAL PROBLEM. CURRENTLY, OPERATIONS ARE LIMITED TO TWO ABSORBERS UNTIL NEW REHEATERS ARE INSTALLED. REHEATER INSTALLATION IS EXPECTED TO

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
                           BE COMPLETED IN APRIL.

 4/80  E             99.3        91.3                    68.5
       F             99.9        71.1                    53.3
       G               .0          .0                      .0
       H             44.2        58.5                    43.9
       SYSTEM       100.0        90.8        98.8        68.1                    720   540    490  66.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           MODULE G IS DOWN FOR MAJOR REPAIRS WHICH WERE A RESULT OF AN INTERNAL FIRE
                           EARLIER IN THE YEAR.

                           A REGULATION CHANGE EFFECTIVE APRIL 18, NOW REQUIRES THAT THREE MODULES
                           OPERATE TO MEET SO2 REGULATIONS (SEE COMMENTS FOR 00/78).

                           MODULE H WAS UNAVAILABLE IN THE BEGINNING OF THE MONTH.

 5/80  E             99.1        97.3                    86.7
       F             98.9        95.2                    84.8
       G               .0          .0                      .0
       H             98.9        91.9                    81.9
       SYSTEM        99.0        94.8       100.0        84.5                    744   663    628  79.1

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE BOILER WAS DOWN FOR SEVERAL HOURS FOR MINOR MAINTENANCE AND BOILER TUBE
                           REPAIRS.

 6/80  E             89.2        72.4                    56.0
       F             89.6        74.1                    57.4
       G               .0          .0                      .0
       H             88.8        83.8                    64.9
       SYSTEM        89.2        76.7        98.3        59.4                    720   557    428  69.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           AN ELECTRICAL CABLE FAILURE PREVENTED MODULES E AND F FROM OPERATING
                           SIMULTANEOUSLY.  AUXILIARY POWER COULD ONLY BE PROVIDED TO ONE MODULE.

 7/80  E             97.6        55.4                    49.1
       F             96.9        85.0                    75.3
       G               .0          .0                      .0
       H             98.9        91.0                    80.6
       SYSTEM        97.8        77.1                    68.3                    744   659    508  79.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE BOILER WAS DOWN FOR SEVERAL DAYS IN JULY TO REPAIR TUBE LEAKS.

                           THE POWER CABLE WHICH FAILED IN JUNE WAS REPAIRED THIS MONTH.  THIS CABLE
                           PERMITS OPERATION OF THE E AND F MODULES WITH THE H MODULE.

 8/80  E             98.4        90.2                    85.8
       F             97.8        72.7                    69.1
       G               .0          .0                      .0
       H             98.3        92.6                    88.0
       SYSTEM        98.2        85.2       100.0        81.0                    744   707    602  88.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           TUBE LEAK REPAIRS IN THE BOILER CAUSED THE FGD SYSTEM NO TO OPERATE FOR
                           TWO DAYS.

 9/80  E             99.0        56.1                    51.9
       F             99.3        56.1                    51.9
       G               .0          .0                      .0
       H             97.6        56.2                    52.1
       SYSTEM        98.6        56.1        62.5        51.9                    720   667    374  85.5
```

PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ESP PROBLEMS CAUSED ERRATIC OPERATION OF THE FGD SYSTEM FOR SEVERAL DAYS IN SEPTEMBER.

THE FGD SYSTEM WAS NOT OPERATED DURING A SCHEDULED OUTAGE OF THE CHEMICAL PLANT. THE SYSTEM WAS AVAILABLE DURING THIS TIME.

MODULE 6 WAS UNAVAILABLE IN SEPTEMBER BECAUSE OF ONGOING REPAIR OF FIRE DAMAGE.

COMPANY NAME	PUBLIC SERVICE OF NEW MEXICO
PLANT NAME	SAN JUAN
UNIT NUMBER	3
CITY	WATERFLOW
STATE	NEW MEXICO
GROSS UNIT GENERATING CAPACITY - MW	534.0
NET UNIT GENERATING CAPACITY W/FGD - MW	468.0
EQUIVALENT SCRUBBED CAPACITY - MW	534.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	18841. (8100 BTU/LB)
AVERAGE ASH CONTENT - %	22.45
AVERAGE MOISTURE CONTENT - %	14.82
AVERAGE SULFUR CONTENT - %	.80
AVERAGE CHLORIDE CONTENT - %	.07
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	WELLMAN LORD
SYSTEM SUPPLIER	DAVY MCKEE
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	3.6
INITIAL START-UP DATE	12/79
COMMERCIAL START-UP DATE	**/**
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0
** BYPRODUCT	
BYPRODUCT NATURE	SULFURIC ACID
DISPOSITION	MARKETED

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	M	86.0	54.4		41.5						
	SYSTEM	86.0	54.4		41.5			744	568	309	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM FIGURES REFLECT THE OPERATION OF A SINGLE MODULE. ONLY ONE MODULE WILL BE NEEDED UNTIL MAY 1982 TO MEET CURRENT SO2 EMISSION REGULATIONS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	M	98.0	13.6		1.0						
	SYSTEM	98.0	13.6		1.0			696	44	7	
3/80	M	85.5	78.3	79.6	56.7						
	SYSTEM	85.5	78.3	79.6	56.7			744	539	422	53.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE ONE MODULE CURRENTLY OPERATIONAL AT SAN JUAN 3 OPERATED WITHOUT ANY MAJOR PROBLEMS DURING THE FIRST QUARTER OF 1980. THE BOILER WAS OFF LINE FOR APPROXIMATELY 24 DAYS IN FEBRUARY DUE TO AN ELECTRICAL PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	M	92.1	82.7	90.1	71.8						
	SYSTEM	92.1	82.7	90.1	71.8			720	625	517	77.0

** PROBLEMS/SOLUTIONS/COMMENTS

MINOR REPAIR WORK WAS DONE TO THE BOILER THIS MONTH. FGD SYSTEM AVAILABILITY WAS OVER 90%.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	M	100.0	78.1	100.0	32.7						
	SYSTEM	100.0	78.1	100.0	32.7			744	311	243	35.0

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PUBLIC SERVICE OF NEW MEXICO: SAN JUAN 3 (CONT.)


-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE BOILER WAS OUT OF SERVICE FOR A SCHEDULED MAINTENANCE OUTAGE.

 6/80  M          49.0         43.3        39.2        27.6
       SYSTEM     49.0         43.3        39.2        27.6                        720   460    127  55.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       MINOR REPAIR AND MAINTENANCE OF THE BOILER CAUSED SYSTEM OUTAGE TIME.

                       THE FGD SYSTEM DID NOT OPERATE AFTER JUNE 19 DUE TO FAILURE OF THE MIST
                       ELIMINATOR MESH PADS AND BOTTOM BALLAST TRAY.

 7/80  M          75.5         89.8        89.8        74.5
       SYSTEM     75.5         89.8        89.8        74.5                        744   617    554  66.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE FGD SYSTEM WAS RETURNED TO SERVICE ON JULY 5TH AFTER BOILER AND FGD
                       SYSTEM REPAIRS WERE MADE.

 8/80  M          83.2         81.6        82.7        80.2
       SYSTEM     83.2         81.6        82.7        80.2                        744   732    597  81.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       BEARINGS ON THE CIRCULATING PUMP WERE REPLACED DURING AUGUST.

                       A PUMP DISCHARGE VALVE WAS REPLACED DUE TO LEAKAGE.

 9/80  M          96.7         59.4        59.1        45.7
       SYSTEM     96.7         59.4        59.1        45.7                        720   549    329  61.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                       THE FGD SYSTEM WAS DOWN FOR SEVERAL DAYS IN SEPTEMBER BECAUSE OF BOILER
                       TUBE LEAKS.

                       THE FGD SYSTEM WAS NOT OPERATED DURING A SCHEDULED OUTAGE OF THE CHEMICAL
                       PLANT.  THE SYSTEM WAS AVAILABLE DURING THIS TIME.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SALT RIVER PROJECT	
PLANT NAME	CORONADO	
UNIT NUMBER	1	
CITY	ST. JOHNS	
STATE	ARIZONA	
GROSS UNIT GENERATING CAPACITY - MW	350.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	350.0	
EQUIVALENT SCRUBBED CAPACITY - MW	280.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	SUBBITUMINOUS	
AVERAGE HEAT CONTENT - J/G	19306.	(8300 BTU/LB)
AVERAGE ASH CONTENT - %	25.00	
AVERAGE MOISTURE CONTENT - %	16.00	
AVERAGE SULFUR CONTENT - %	1.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	PULLMAN KELLOGG	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	4.3	
INITIAL START-UP DATE	11/79	
COMMERCIAL START-UP DATE	12/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	66.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.87	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	17.0	(270 GPM)
** DISPOSAL		
TYPE	LINED POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE PERIOD STACK EMISSION TESTS WERE COMPLETED. NO OPERATIONAL INFORMATION WAS AVAILABLE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

ALTHOUGH FGD SYSTEM PERFORMANCE DATA ARE BEING LOGGED, THE UTILITY REPORTED THAT THE INFORMATION IS UNAVAILABLE FOR RELEASE AT THIS TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

SALT RIVER PROJECT: CORONADO 1 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY WILL NOT AUTHORIZE THE RELEASE OF FGD PERFORMANCE DATA AT THIS TIME, BUT NOTED THAT THE SYSTEM IS TO SHUT DOWN ON NOVEMBER 1, 1980 FOR A MAJOR OVERHAUL.

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                                               SECTION 3
                DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                     SALT RIVER PROJECT
PLANT NAME                                       CORONADO
UNIT NUMBER                                      2
CITY                                             ST. JOHNS
STATE                                            ARIZONA
REGULATORY CLASSIFICATION                        D
PARTICULATE EMISSION LIMITATION - NG/J             43.        (  .100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                    344.        (  .800 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                700.0
GROSS UNIT GENERATING CAPACITY - MW               350.0
NET UNIT GENERATING CAPACITY W/FGD - MW           350.0
NET UNIT GENERATING CAPACITY WO/FGD - MW          365.0
EQUIVALENT SCRUBBED CAPACITY - MW                 280.0

** BOILER DATA
    SUPPLIER                                     RILEY STOKER
    TYPE                                         PULVERIZED COAL
    SERVICE LOAD                                 BASE
    COMMERCIAL SERVICE DATE                       4/80
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S         1226.94      (2600000 ACFM)
    FLUE GAS TEMPERATURE - C                       404.4       ( 760 F)
    STACK HEIGHT - M                               152.        ( 500 FT)
    STACK TOP DIAMETER - M                           5.8       ( 19.0 FT)

** FUEL DATA
    FUEL TYPE                                    COAL
    FUEL GRADE                                   SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                    19306.       (  8300 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                 8,000-11,000
    AVERAGE ASH CONTENT - %                          25.00
    RANGE ASH CONTENT - %                        19-35
    AVERAGE MOISTURE CONTENT - %                     16.00
    RANGE MOISTURE CONTENT - %                   12-20
    AVERAGE SULFUR CONTENT - %                        1.00
    RANGE SULFUR CONTENT - %                     0.4-1.0
    AVERAGE CHLORIDE CONTENT - %                 ********
    RANGE CHLORIDE CONTENT - %                   ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT           THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                         WET SCRUBBING
    PROCESS TYPE                                 LIMESTONE
    PROCESS ADDITIVES                            NONE
    SYSTEM SUPPLIER                              PULLMAN KELLOGG
    A-E FIRM                                     BECHTEL
    CONSTRUCTION FIRM                            BECHTEL
    DEVELOPMENT LEVEL                            FULL SCALE
    NEW/RETROFIT                                 NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.87
    SO2 DESIGN REMOVAL EFFICIENCY - %               66.00
    COMMERCIAL DATE                              10/80
    INITIAL START-UP                              7/80
    CONSTRUCTION COMPLETION                      11/79
    CONSTRUCTION INITIATION                       5/77
    CONTRACT AWARDED                              6/76

** ESP
    NUMBER                                        2
    TYPE                                         HOT SIDE
    SUPPLIER                                     WESTERN PRECIPITATION
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.8
    FLUE GAS CAPACITY - CU.M/S                    1321.3       (2800000 ACFM)
    FLUE GAS TEMPERATURE - C                       404.4       (  760 F)
    PRESSURE DROP - KPA                          *******       (***** IN-H2O)
    PARTICULATE OUTLET LOAD - G/CU.M                 .00       (    .00 GR/SCF)

** PARTICLE SCRUBBER
    TYPE                                         NONE

** ABSORBER
    NUMBER                                        2
    TYPE                                         SPRAY TOWER
    INITIAL START UP                              1/80
    SUPPLIER                                     PULLMAN KELLOGG
```

```
SALT RIVER PROJECT: CORONADO 2 (CONT.)

       NUMBER OF STAGES                           4
       DIMENSIONS - FT                          120 L X 28 W X 17 H
       SHELL MATERIAL                           CARBON STEEL
       INTERNAL MATERIAL                        POLYESTER RESIN
       NUMBER OF NOZZLES                          144
       BOILER LOAD/ABSORBER - %                    40.0
       GAS FLOW - CU.M/S                           25.48        (  54000 ACFM)
       GAS TEMPERATURE - C                         46.1         (   115 F)
       LIQUID RECIRCULATION RATE - LITER/S        630.          (10000 GPM)
       L/G RATIO - L/CU.M                           3.3         ( 25.0 GAL/1000ACF)
       PRESSURE DROP - KPA                           .4         ( 1.5 IN-H2O)
       SO2 INLET CONCENTRATION - PPM             1000
       SO2 OUTLET CONTRATION - PPM                180
       SO2 OUTLET CONCENTRATION- NG/J           *****           (***** LB/MMBTU)
       SO2 DESIGN REMOVAL EFFICIENCY - %           82.0
       ABSORBER SPARE CAPACITY INDEX - %             .0
       ABSORBER SPARE COMPONENT INDEX                .0

 ** FANS
       NUMBER                                    2
       TYPE                                     SCRUBBER F.D.
       SERVICE - WET/DRY                        DRY
       CAPACITY - CU.M/S                          304.32        ( 644880 ACFM)

 ** MIST ELIMINATOR
       NUMBER                                    2
       TYPE                                     CHEVRON
       CONSTRUCTION MATERIAL                    HEIL NORYL E-265
       CONFIGURATION                            VERTICAL
       NUMBER OF STAGES                             1
       NUMBER OF PASSES                             3
       FREEBOARD DISTANCE - M                       8.84        (29.0 FT)
       DEPTH - M                                     .21        (  .7 FT)
       VANE SPACING - CM                            3.2         ( 1.25 IN)
       WASH SYSTEM                              MAKEUP WATER SPRAY
       SUPERFICIAL GAS VELOCITY - M/S               4.6         ( 15.0 FT/S)

 ** PROCESS CONTROL CHEMISTRY
       CONTROL VARIABLES                        SO2 INLET CONCENTRATION GAS FLOW, PH
       CONTROL RANGE                            0-1000 PPM SO2, 0-500,000 SCFM, 4-8 PH
       CONTROL MANNER                           AUTOMATIC AND MANUAL
       MODE                                     FEED FORWARD
       SENSOR LOCATION                          INLET DUCT, FIRST AND FOURTH STAGES (PH)

 ** PUMPS
       SERVICE                                  NUMBER
       -------                                  ------
       SLURRY RECIRCULATION                      10
       SLUDGE DISPOSAL                            4
       SLURRY PURGE                               4
       ALKALI MAKEUP                              1
       PROCESS WATER                              2
       SEAL WATER                                 1
       HIGH PRESSURE SEAL WATER                   2
       MIST ELIMINATOR WASH                       2
       ******                                   ****

 ** TANKS
       SERVICE                                  NUMBER
       -------                                  ------
       REACTION MIX                             ****
       PROCESS WATER                              2
       MIST ELIMINATOR                            2
       SEAL WATER                                 1
       LIMESTONE SLURRY STORAGE                   1
       SLUDGE STORAGE                             1

 ** REHEATER
       TYPE                                     BYPASS
       TEMPERATURE BOOST - C                      27.8          (    50 F)

 ** THICKENER
       NUMBER                                    1
       TYPE                                     CENTER FEED WELL
       DIAMETER - M                               32.0          (105 FT)
       OUTLET SOLIDS - %                          30.0
```

SALT RIVER PROJECT: CORONADO 2 (CONT.)

** WATER LOOP

TYPE	OPEN	
EVAPORATOR WATER LOSS - LITER/S	13.2	(210 GPM)
SLUDGE WATER LOSS - LITER/S	3.8	(60 GPM)
POND WATER LOSS - LITER/S	.0	(0 GPM)
PURGE WATER LOSS - LITER/S	.0	(0 GPM)
OTHER WATER LOSSES - LITER/S	.0	(0 GPM)
RECOVERED WATER RETURN - LITER/S	.0	(0 GPM)
FRESH MAKEUP WATER ADDITION - LITERS/S	17.0	(270 GPM)

** REAGENT PREPARATION EQUIPMENT

NUMBER OF STORAGE HOPPERS	1	
NUMBER OF BALL MILLS	2	
NUMBER OF SLAKERS	0	
BALL MILL CAPACITY- M T/H	11.8	(13.0 TPH)
REAGENT PRODUCT - % SLURRY SOLIDS	20.0	
POINT OF ADDITION	REACTION MIX TANK BENEATH EACH ABSORBER TRAIN	

** DISPOSAL

NATURE	FINAL	
TYPE	LINED POND	
LOCATION	ON SITE	
TRANSPORTATION	PIPE	
AREA - ACRES	28.0	
CAPACITY - CU.M	4525100	(3700.0 ACRE-FT)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL OPERATION OF THE FGD SYSTEM AT THE CORONADO 2 STATION COMMENCED IN JULY, 1980.

DURING THE THIRD QUARTER 1980 A BEARING INSPECTION WAS CONDUCTED. THE UNIT IS PRESENTLY IN THE PROCESS OF BEGINNING COMMERCIAL OPERATION.

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                                   SECTION 3
              DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                    SOUTH CAROLINA PUBLIC SERVICE
PLANT NAME                                      WINYAH
UNIT NUMBER                                     2
CITY                                            GEORGETOWN
STATE                                           SOUTH CAROLINA
GROSS UNIT GENERATING CAPACITY - MW               280.0
NET UNIT GENERATING CAPACITY W/FGD - MW           258.0
EQUIVALENT SCRUBBED CAPACITY - MW                 140.0

** FUEL DATA
    FUEL TYPE                                   COAL
    FUEL GRADE                                  BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                   26749.          ( 11500 BTU/LB)
    AVERAGE ASH CONTENT - %                         13.50
    AVERAGE MOISTURE CONTENT - %                ********
    AVERAGE SULFUR CONTENT - %                       1.70
    AVERAGE CHLORIDE CONTENT - %                ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                        WET SCRUBBING
    PROCESS TYPE                                LIMESTONE
    SYSTEM SUPPLIER                             BABCOCK & WILCOX
    NEW/RETROFIT                                NEW
    ENERGY CONSUMPTION - %                           1.1
    INITIAL START-UP DATE                        7/77
    COMMERCIAL START-UP DATE                    **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %               45.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.40
    ABSORBER SPARE CAPACITY INDEX - %                 .0
    ABSORBER SPARE COMPONENTS INDEX                   .0

** WATER LOOP
    TYPE                                        OPEN
    FRESH MAKE-UP WATER - LITER/S                    6.3         (  100 GPM)

** DISPOSAL
    TYPE                                        POND


-------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----  ----- ----- ------ ----- ------

1/80   SYSTEM                                                                744

2/80   SYSTEM                                                                696

3/80   SYSTEM                                                                744

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           DURING THE FIRST QUARTER OF 1980 NO MAJOR FGD RELATED PROBLEMS WERE
                           REPORTED.

4/80   SYSTEM      100.0       100.0       100.0        85.3                 720   614    614  60.2

5/80   SYSTEM       95.8        94.9        94.9        77.7                 744   609    578  61.9

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM WAS OFF LINE THROUGH PART OF MAY TO WASH DOWN THE ABSORBER
                           MODULES.

6/80   SYSTEM      100.0       100.0       100.0        99.6                 720   718    718  76.6

        ** PROBLEMS/SOLUTIONS/COMMENTS

                           NUMEROUS LEAKS IN THE FGD SYSTEM WERE REPAIRED THROUGHOUT THE PERIOD WHILE
                           THE BOILER AND SCRUBBER WERE IN SERVICE.  NO MAJOR OPERATIONAL PROBLEMS
                           WERE REPORTED FOR APRIL, MAY, OR JUNE.

7/80   SYSTEM      100.0       100.0       100.0       100.0                 744   744    744  75.3
```

SOUTH CAROLINA PUBLIC SERVICE: WINYAH 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

NO OPERATIONAL PROBLEMS WERE REPORTED DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM	99.7	99.7	99.7	88.3			744	659	657	74.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE GRIT SEPARATOR PLUGGED CAUSING A TWO HOUR OUTAGE. THE FGD SYSTEM WAS AVAILABLE THROUGH ALL OF AUGUST EXCEPT FOR THIS SHORT OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM	96.5	100.0	100.0	87.2			720	629	629	73.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND FGD SYSTEM WENT DOWN FOR A SCHEDULED MAINTENANCE OVERHAUL ON SEPTEMBER 30, 1980. WORK SCHEDULED TO BE DONE INCLUDED INSTALLING A SECOND TRAY IN THE ABSORBER MODULE, RENEWING DEMISTER WASH SYSTEM WITH ALLOY 20 PIPING, AND CLEANING SCALE DEPOSITS FROM QUENCHER THROAT.

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COMPANY NAME                                        SOUTH CAROLINA PUBLIC SERVICE
PLANT NAME                                          WINYAH
UNIT NUMBER                                         3
CITY                                                GEORGETOWN
STATE                                               SOUTH CAROLINA
REGULATORY CLASSIFICATION                           B
PARTICULATE EMISSION LIMITATION - NG/J              ******         (****** LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                      ******         (****** LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW                  *******
GROSS UNIT GENERATING CAPACITY - MW                   280.0
NET UNIT GENERATING CAPACITY W/FGD - MW               252.0
NET UNIT GENERATING CAPACITY WO/FGD - MW              258.0
EQUIVALENT SCRUBBED CAPACITY - MW                     280.0

** BOILER DATA
    SUPPLIER                                        RILEY STOKER
    TYPE                                            PULVERIZED COAL
    SERVICE LOAD                                    BASE
    COMMERCIAL SERVICE DATE                         **/**
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S           *********      (******* ACFM)
    FLUE GAS TEMPERATURE - C                        ********       (**** F)
    STACK HEIGHT - M                                *******        (**** FT)
    STACK TOP DIAMETER - M                          ********       (***** FT)

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      *******
    AVERAGE HEAT CONTENT - J/G                       26749.        ( 11500 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                     *******
    AVERAGE ASH CONTENT - %                         *********
    RANGE ASH CONTENT - %                           *******
    AVERAGE MOISTURE CONTENT - %                    *********
    RANGE MOISTURE CONTENT - %                      *******
    AVERAGE SULFUR CONTENT - %                          1.70
    RANGE SULFUR CONTENT - %                        *******
    AVERAGE CHLORIDE CONTENT - %                    *********
    RANGE CHLORIDE CONTENT - %                      *******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT              THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    LIMESTONE
    SYSTEM SUPPLIER                                 BABCOCK & WILCOX
    A-E FIRM                                        BURNS & ROE
    DEVELOPMENT LEVEL                               FULL SCALE
    NEW/RETROFIT                                    NEW
    SO2 DESIGN REMOVAL EFFICIENCY - %                 90.00
    COMMERCIAL DATE                                  6/80
    INITIAL START-UP                                 5/80
    CONSTRUCTION INITIATION                          3/79

** ESP
    NUMBER                                           1
    SUPPLIER                                        RESEARCH-COTTRELL

** PARTICLE SCRUBBER
    TYPE                                            NONE

** ABSORBER
    NUMBER                                           2
    TYPE                                            SPRAY TOWER
    INITIAL START UP                                 5/80
    SUPPLIER                                        BABCOCK & WILCOX
    SO2 DESIGN REMOVAL EFFICIENCY - %                 90.0

** MIST ELIMINATOR
    TYPE                                            CHEVRON

** PUMPS
    SERVICE                                         NUMBER
    -------                                         ------
    ******                                          ****
```

SOUTH CAROLINA PUBLIC SERVICE: WINYAH 3 (CONT.)

** REHEATER	
TYPE	HOT AIR INJECTION
HEATING MEDIUM	STEAM
** WATER LOOP	
TYPE	CLOSED

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
6/80	SYSTEM	60.0	60.0	60.0	46.6			720	559	336	59.5

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL FGD OPERATIONS BEGAN JUNE 3, 1980.

THE INLET DAMPER LOCKED UP FORCING THE FGD SYSTEM OUT OF SERVICE FOR PART OF JUNE.

THERE HAVE BEEN CONTINUING PROBLEMS WITH THE THICKENER SUMP RESULTING FROM IT'S LOCATION. THESE PROBLEMS FORCED THE FGD SYSTEM OUT OF SERVICE FOR APPROXIMATELY 7 DAYS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
7/80	A	12.8	12.8	12.8	12.8						
	B	12.8	12.8	12.8	12.8						
	SYSTEM	12.8	12.8	12.8	12.8			744	744	95	79.8

** PROBLEMS/SOLUTIONS/COMMENTS

THE THICKNER RAKE DRIVE MECHANISM WAS REPAIRED DURING JULY.

THE LARGE BELT DRIVEN PUMP HAS BEGUN TO SHOW SIGNS OF RAPID WEAR.

THE FGD SYSTEM WAS OUT OF SERVICE BECAUSE OF COMPUTER LOGIC PROBLEMS CAUSED BY A BAD CABLE.

THE THICKNER SUMP PUMP AND MIXER MOTORS WERE FLOODED OUT CAUSING THE FGD SYSTEM TO GO DOWN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
8/80	A	18.0	20.4	20.4	18.0						
	B	18.0	20.4	20.4	18.0						
	SYSTEM	18.0	20.4	20.4	18.0			744	658	134	79.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE THICKNER SUMP PUMP AND MIXER MOTORS CONTINUED TO HAVE PROBLEMS BECAUSE OF THE FLOODING LAST MONTH.

THE SCRUBBER OUTLET DAMPER WOULD NOT CLOSE PROPERLY WHICH REQUIRED WORK DURING AUGUST.

THE ABSORBER TRAY STRAP WAS BROKEN IN SEVERAL AREAS AND REQUIRED REPAIR WORK DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR
9/80	A	.0	.0	.0	.0						
	B	.0	.0	.0	.0						
	SYSTEM	.0	.0	.0	.0			720	647	0	84.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS OUT OF SERVICE THROUGH ALL OF SEPTEMBER BECAUSE OF REPAIRS BEING MADE ON THE THICKNER.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SOUTH MISSISSIPPI ELEC PWR	
PLANT NAME	R.D. MORROW, SR.	
UNIT NUMBER	1	
CITY	HATTISBURG	
STATE	MISSISSIPPI	
GROSS UNIT GENERATING CAPACITY - MW	200.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	180.0	
EQUIVALENT SCRUBBED CAPACITY - MW	124.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	27912.	(12000 BTU/LB)
AVERAGE ASH CONTENT - %	15.00	
AVERAGE MOISTURE CONTENT - %	6.50	
AVERAGE SULFUR CONTENT - %	1.30	
AVERAGE CHLORIDE CONTENT - %	.01	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	ENVIRONEERING, RILEY STOKER	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	5.5	
INITIAL START-UP DATE	8/78	
COMMERCIAL START-UP DATE	8/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	52.70	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.60	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	.0		.0	.0			740	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OFF LINE DURING JANUARY AS RELINING OF THE SCRUBBERS WAS COMING TO COMPLETION.

THE PRESATURATOR AREAS, BYPASS DUCTS, AND THE SECTIONS OF DUCT FROM ABSORBER EXITS AT POINTS WHERE BYPASSED GAS MIXES WITH WET GAS ALL THE WAY TO THE STACK ARE BEING LINED WITH HASTELLOY G (A 1/8 INCH LINING IS BEING WELDED TO THE EXISTING CARBON STEEL).
THE MAIN BODY OF THE ABSORBER MODULES IMMEDIATELY ABOVE THE PRESATURATOR SECTIONS ALL THE WAY TO THE ABSORBER EXIT IS BEING LINED WITH CHLOROBUTYL RUBBER (ON THE EXISTING CARBON STEEL).

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	.0		.0	.0			696	0	0	.0
3/80	SYSTEM	41.5	95.1	100.0	39.5			744	309	294	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE UNIT 1 FGD SYSTEM RETURNED TO SERVICE OPERATING 294 HOURS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	99.0	100.0	99.0	80.00		720	720	713	

```
-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THERE WERE NO OPERATIONAL PROBLEMS RELATED TO THE FGD SYSTEM DURING APRIL.
                             FOUR INSPECTIONS WERE PERFORMED WHICH REQUIRED THE FGD SYSTEM TO BE OUT
                             OF SERVICE FOR SEVEN HOURS.

 5/80  SYSTEM      99.7         99.8        100.0        88.7     80.00         744   660    658

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE BOILER WAS SCHEDULED TO BE OUT OF SERVICE FOR 84 HOURS TO CLEAN THE
                             AIR PREHEATERS.  THE BOILER OPERATED THE REMAINING HOURS IN MAY.

                             THE FGD SYSTEM WAS SCHEDULED TO BE OUT OF SERVICE FOR 1.5 HOURS FOR ROU-
                             TINE MODULE INSPECTION.  THE FGD SYSTEM WAS AVAILABLE 99.7% DURING MAY.

 6/80  SYSTEM      99.2         97.0         99.0        93.0     90.00         720   690    668  68.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING JUNE OPERATIONS CAME TO A HAULT FOR APPROXIMATELY SIX HOURS TO CLEAN
                             THE MIST ELIMINATORS.  OTHER OUTAGE TIME DURING THE MONTH WAS CAUSED
                             BY BOILER-RELATED PROBLEMS.

 7/80  SYSTEM      94.1         99.3         99.3        94.1     90.00         744   705    700  67.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING JULY THE SCRUBBER WAS INSPECTED FOR SCALE ACCUMULATION AND A TRIP
                             TEST WAS CONDUCTED ON THE SCRUBBER CONTROLS TO CHECK ON EARLIER MODIFICA-
                             TIONS.

                             THE MAJORITY OF OUTAGE TIME WAS CAUSED BY A MALFUNCTION OF THE BALL MILL.
                             THIS RESULTED IN A LOSS OF LIMESTONE SUPPLY IN THE STORAGE TANK.

                             A LEAK IN THE FEED WATER LINE CAUSED ADDITIONAL OUTAGE TIME DURING THE
                             MONTH.

 8/80  SYSTEM     100.0        100.0        100.0       100.0     80.00         744   744    744  77.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             NO PROBLEMS WERE ENCOUNTERED DURING THE MONTH OF AUGUST.

 9/80  SYSTEM      99.2         99.6         99.6        99.2                   720   717    714  70.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING SEPTEMBER THE SCRUBBER WAS INSPECTED CAUSING TWO HOURS OF
                             OUTAGE TIME.

                             A BRIEF FGD OUTAGE OF 12 MINUTES WAS CAUSED BY AN ELECTRICAL SHORT.

                             THE UNIT AND FGD SYSTEM WERE OUT OF SERVICE FOR APPROXIMATELY 3 1/2 HOURS
                             DUE TO ESP PROBLEMS.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SOUTH MISSISSIPPI ELEC PWR
PLANT NAME	R.D. MORROW, SR.
UNIT NUMBER	2
CITY	HATTISBURG
STATE	MISSISSIPPI
GROSS UNIT GENERATING CAPACITY - MW	200.0
NET UNIT GENERATING CAPACITY W/FGD - MW	180.0
EQUIVALENT SCRUBBED CAPACITY - MW	124.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	27912. (12000 BTU/LB)
AVERAGE ASH CONTENT - %	15.00
AVERAGE MOISTURE CONTENT - %	6.50
AVERAGE SULFUR CONTENT - %	1.30
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PROCESS TYPE	LIMESTONE
SYSTEM SUPPLIER	ENVIRONEERING, RILEY STOKER
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	5.5
INITIAL START-UP DATE	6/79
COMMERCIAL START-UP DATE	6/79
SO2 DESIGN REMOVAL EFFICIENCY - %	52.70
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.60
ABSORBER SPARE CAPACITY INDEX - %	.0
ABSORBER SPARE COMPONENTS INDEX	.0
** WATER LOOP	
TYPE	CLOSED
FRESH MAKE-UP WATER - LITER/S	******* (***** GPM)
** TREATMENT	
TYPE	FLYASH STABILIZATION
** DISPOSAL	
TYPE	LANDFILL

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	.0		.0	.0			744	743	0	75.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT REMAINED OFF LINE DURING JANUARY WHILE SCRUBBER LINER REPAIRS CONTINUED.

THE PRESATURATOR AREAS, BYPASS DUCTS, AND THE SECTIONS OF DUCT FROM ABSORBER EXITS AT POINTS WHERE BYPASSED GAS MIXES WITH WET GAS ALL THE WAY TO THE STACK ARE BEING LINED WITH HASTELLOY G (A 1/8 INCH LINING IS BEING WELDED TO THE EXISTING CARBON STEEL).
THE MAIN BODY OF THE ABSORBER MODULES IMMEDIATELY ABOVE THE PRESATURATOR SECTIONS ALL THE WAY TO THE ABSORBER EXIT IS BEING LINED WITH CHLOROBUTYL RUBBER (ON THE EXISTING CARBON STEEL).

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	.0	.0	.0	.0			696	698	0	75.0
3/80	SYSTEM	.0	.0	.0	.0	.00		744	486	0	
4/80	SYSTEM	.0			.0	.00		720	0	0	.0

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM REMAINED OFF LINE THROUGH APRIL AS SCRUBBER LINER REPAIRS CONTINUED. THE UNIT IS EXPECTED BACK ON LINE AT THE END OF MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	2.4	14.2	14.2	2.4	85.00		744	127	18	

SOUTH MISSISSIPPI ELEC PWR: R.D. MORROW, SR. 2 (CONT.)

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------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2   PART. HOURS HOURS HOURS FACTOR
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       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE UNIT REMAINED OFF LINE DURING MOST OF MAY TO COMPLETE SCRUBBER AND
                             STACK LINING MODIFICATIONS.

                             THE BOILER OPERATED 127 HOURS IN MAY; HOWEVER, THE FGD SYSTEM OPERATED
                             ONLY 18 HOURS BECAUSE OF COMPUTER CONTROL PROBLEMS.

 6/80  SYSTEM      99.3          90.0        99.1        78.0     90.00         720   625    561  68.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE FGD SYSTEM COMPUTER LOST POWER DURING JUNE CAUSING THE UNIT TO
                             BE SHUT DOWN FOR 25 MINUTES.

                             DURING JUNE OPERATIONS CAME TO A HAULT FOR APPROXIMATELY FIVE HOURS TO
                             CLEAN THE MIST ELIMINATORS.  OTHER OUTAGE TIME DURING THE MONTH WAS CAUSED
                             BY BOILER RELATED PROBLEMS.

 7/80  SYSTEM      79.8          80.7        80.7        79.8     85.00         744   736    594  73.8

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING JULY BALL MILL REPAIRS ACCOUNTED FOR THE MAJOR PORTION OF THE FGD-
                             RELATED OUTAGE TIME.

                             THE SCRUBBER WAS INSPECTED FOR SCALE ACCUMULATION AND A TRIP TEST WAS
                             CONDUCTED ON THE SCRUBBER CONTROLS TO CHECK ON EARLIER MODIFICATIONS.

                             THE SCRUBBING SYSTEM WENT OFF LINE DUE TO AN ALARM TRIGGERED BY HIGH
                             TEMPERATURE, WHICH WAS DETERMINED TO BE A FALSE ALARM.

                             A POSSIBLE TUBE LEAK SHUT THE BOILER DOWN ON JULY 27.  THE UNIT WENT BACK
                             ON LINE WITHOUT FINDING THE LEAK.  THE BOILER WAS THEN TAKEN OFF LINE ON
                             JULY 28 TO FIND THE LEAK AND MAKE THE NECESSARY REPAIRS.

                             PROBLEMS WITH THE BURNER MANAGEMENT CONTROL SYSTEM ALSO CAUSED A BOILER-
                             RELATED OUTAGE.

 8/80  SYSTEM      98.8          99.5        99.5        98.8     80.00         744   739    735  74.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             THE BOILER WAS OUT OF SERVICE APPROXIMATELY FIVE HOURS DURING AUGUST DUE
                             TO A BOILER TUBE LEAK.

                             AFTER THE REPAIRS TO THE BOILER TUBE AN ADDITIONAL FOUR HOURS OF OUTAGE
                             TIME WAS NECESSARY TO START UP THE FGD SYSTEM.

 8/80  SYSTEM      98.8          99.5        99.5        98.8     80.00         744   739    735  74.3

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING AUGUST THE FGD SYSTEM WAS SHUT DOWN FOR FOUR HOURS FOR REPAIR OF A
                             TUBE LEAK.

 9/80  SYSTEM      99.8          99.5        99.5        88.3                   720   639    636  62.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                             DURING SEPTEMBER THE BOILER WAS TAKEN OUT OF SERVICE FOR APPROXIMATELY
                             83 HOURS DUE TO A TUBE LEAK.

                             A BOILER INSPECTION AND AN ELECTRICAL SHORT IN THE CONTROLS CAUSED THE
                             FGD SYSTEM TO SHUT DOWN WITH THE BOILER FOR APPROXIMATELY 1 1/2 HOURS.
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SECTION 3

DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SOUTHERN ILLINOIS POWER COOP	
PLANT NAME	MARION	
UNIT NUMBER	4	
CITY	MARION	
STATE	ILLINOIS	
GROSS UNIT GENERATING CAPACITY - MW	173.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	161.0	
EQUIVALENT SCRUBBED CAPACITY - MW	173.0	
** FUEL DATA		
FUEL TYPE	COAL/REFUSE	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	23841.	(10250 BTU/LB)
AVERAGE ASH CONTENT - %	16.69	
AVERAGE MOISTURE CONTENT - %	12.20	
AVERAGE SULFUR CONTENT - %	3.75	
AVERAGE CHLORIDE CONTENT - %	.10	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	BABCOCK & WILCOX	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	2.3	
INITIAL START-UP DATE	5/79	
COMMERCIAL START-UP DATE	6/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	89.40	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	.00	
ABSORBER SPARE CAPACITY INDEX - %	38.0	
ABSORBER SPARE COMPONENTS INDEX	.6	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM				.0			744	0	0	.0
11/79	SYSTEM		100.0		26.7			720	192	192	
12/79	SYSTEM		100.0		71.0			744	528	528	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT WAS DOWN FROM OCTOBER 1 THROUGH NOVEMBER 17 FOR A BOILER/TURBINE INSPECTION. NO MAJOR FGD RELATED PROBLEMS WERE ENCOUNTERED DURING THE FOURTH QUARTER OF 1979 OTHER THAN SOME FREEZE-UPS CAUSED BY THE WINTER WEATHER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		10.0			744	72	72	
2/80	SYSTEM		100.0		31.0			696	216	216	
3/80	SYSTEM		100.0		48.4			744	360	360	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE LOW BOILER AND SCRUBBER HOURS WERE A RESULT OF AN 18 DAY BOILER OUTAGE NEEDED FOR CORRECTION OF TUBE PROBLEMS. BOILER OUTAGES DUE TO TUBE PROBLEMS WERE ALSO EXPERIENCED IN FEBRUARY AND MARCH.

THE ONLY REPORTED FGD-RELATED PROBLEM DURING THE FIRST QUARTER OF 1980 WAS

SOUTHERN ILLINOIS POWER COOP: MARION 4 (CONT.)

PERFORMANCE DATA

MAINTAINING THE BELT ALIGNMENT IN THE SLUDGE DISPOSAL SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	66.7	66.7	66.7	66.7			720	720	480	81.3

** PROBLEMS/SOLUTIONS/COMMENTS

SHAFT BREAKAGE WITHIN THE RECLAIM WATER PUMP CAUSED FGD SYSTEM OUTAGE TIME DURING APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	77.4	58.8	58.8	32.3			744	408	240	49.6

** PROBLEMS/SOLUTIONS/COMMENTS

A BOILER OUTAGE CAUSED THE FGD SYSTEM NOT TO OPERATE FOR TWO WEEKS.

SHAFT BREAKAGE WITHIN THE WATER RECLAIM PUMP CONTINUED THROUGH MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	50.0	50.0	50.0	50.0			720	720	360	82.3

** PROBLEMS/SOLUTIONS/COMMENTS

SHAFT BREAKAGE WITHIN THE WATER RECLAIM PUMP CONTINUED TO CAUSE FGD OUTAGE TIME. A SOLUTION HAS BEEN PROPOSED TO SIPCO BY THEIR ENGINEERING CONSULTANT FOR CONSIDERATION.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	96.7	100.0	100.0	95.9			744	714	714	82.0

** PROBLEMS/SOLUTIONS/COMMENTS

AFTER REVIEW OF THE PROPOSED SOLUTION OF THE SHAFT BREAKAGE PROBLEM WITHIN THE RECLAIM WATER PUMP, SIPCO AUTHORIZED THEIR CONSULTANT TO PROCEED WITH THE WORK TO CORRECT THE PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM	100.0	100.0	100.0	90.5			744	673	673	89.6

** PROBLEMS/SOLUTIONS/COMMENTS

PROBLEMS WITH THE SHAFT BREAKAGE IN THE RECLAIM WATER PUMPS CONTINUED THROUGH AUGUST. A REPLACEMENT PUMP HAS BEEN PURCHASED TO SOLVE THE PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	A	100.0	100.0	100.0	100.0						
	B	100.0	100.0	100.0	100.0						
	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	100.0

** PROBLEMS/SOLUTIONS/COMMENTS

SUMMARY OF GENERAL PROBLEMS TO DATE

THE MAJOR CAUSES OF SCRUBBER OUTAGES HAVE CENTERED AROUND COLD WEATHER-RELATED CONVEYOR BELT AND PIPING PROBLEMS, PUG MILL BEARING FAILURES, AND RECLAIM WATER PUMP SHAFT FAILURES. OTHER PROBLEMS HAVE BEEN RELATED TO PROCESS CHEMISTRY CONTROL. THE UTILITY REPORTED THAT NUMEROUS SMALL PROBLEMS ALSO HAVE OCCURRED BUT HAVE GENERALLY BEEN CORRECTED SOON AFTER THEIR DISCOVERY. DETAILS OF THE PRIMARY SCRUBBER PROBLEMS ARE OUTLINED BELOW:

COLD WEATHER PROBLEMS

THE MOST SEVERE FREEZING PROBLEM CONCERNS THE SLUDGE CONVEYOR SYSTEM. WHEN THE AMBIENT TEMPERATURE DROPS BELOW 30 F THE CONVEYOR SYSTEM BECOMES INOPERABLE. THE UTILITY HAS ATTEMPTED TO REMOVE THE FROZEN SLUDGE USING VARIOUS COMMERCIAL AND COMPANY-BUILT SCRAPERS WITH LITTLE SUCCESS. THE UTILITY ALSO INSTALLED HEATERS AT THE VARIOUS TRANSFER POINTS TO THAW THE SLUDGE. THIS PROVED UNSUCCESSFUL AS WELL. THE PROBLEM HAS NOT YET BEEN SOLVED.

AN ADDITIONAL PROBLEM WITH THE CONVEYOR SYSTEM HAS BEEN THE FAILURE OF THE BELT TO TRACK CORRECTLY. ON SEVERAL OCCASIONS THE BELT HAS TOUCHED THE STRUCTURAL STEEL SUPPORTS RESULTING IN BELT DAMAGE. HOWEVER, BY RE-

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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DUCING THE CONVEYOR SPEED THE UTILITY HAS INCREASED THE ESTIMATED BELT LIFE FROM FIVE TO 10 YEARS.

THE OTHER COLD WEATHER PROBLEM IS RELATED TO THE SCRUBBER VESSEL PIPING SYSTEM. ON SEVERAL OCCASIONS WATER LINE FREEZE UPS HAVE RESULTED IN SCRUBBER OUTAGES. WHEN THE PROBLEM WAS DISCOVERED, THE UTILITY INSTALLED EXTENSIVE HEAT TRACING ON EXPOSED WATER LINES. ALTHOUGH THERE HAS BEEN NO COLD WEATHER SINCE THE HEAT TRACING INSTALLATION, THE UTILITY BELIEVES THAT THE PROBLEM IS SOLVED.

PUG MILL PROBLEM

SEVERAL BEARING FAILURES HAVE OCCURRED ON THE PUG MILL. THE UTILITY HAS INCREASED THE MAINTENANCE ON THE MILL SYSTEM TO LESSEN THE LIKELIHOOD OF ANOTHER FAILURE. THE UTILITY REPORTED THAT IF THIS PROCEDURE MODIFICATION DOES NOT INCREASE THE PUG MILL RELIABILITY TO AN ACCEPTABLE LEVEL OTHER ACTION WILL BE TAKEN.

RECLAIM WATER PUMP SHAFT FAILURE

THE RECLAIM WATER PUMPS PRODUCE A VERY FLAT OUTPUT PRESSURE CURVE BUT THEY FEED A SYSTEM COMPOSED OF MANY AUTOMATICALLY CONTROLLED DIAPHRAGM VALVES. THE OPENING AND CLOSING OF THESE VALVES EXPOSES THE PUMPS TO A WIDE VARIABILITY IN WATER REQUIREMENTS. MOTOR SHAFT FATIGUE RESULTS WHEN THE PUMPS ATTEMPT TO RESPOND TO THE VARIABLE DEMAND. THE SYSTEM SUPPLIER IS CURRENTLY SUPPLYING THE UTILITY WITH INFORMATION ON THE OPERATION OF THE DIAPHRAGM VALVES. THE UTILITY'S CONSULTANT ENGINEERING FIRM WILL REVIEW THE MATERIAL AND SUGGEST POSSIBLE CONTROL VALVE CHANGES. THE UTILITY REPORTED THAT IF THIS IS NOT POSSIBLE OR DOES NOT WORK, A DESIGN CHANGE TO A DIFFERENT PUMP TYPE WILL BE CONSIDERED. WHILE THE PROBLEM CONTINUES, THE UTILITY IS KEEPING A COMPLETE SHAFT AND IMPELLER ON SITE.

PROCESS CHEMISTRY

THE UTILITY HAS LOST CONTROL OF THE PROCESS CHEMISTRY SEVERAL TIMES. THE SLURRY SOLIDS LEVEL HAS CONSEQUENTLY INCREASED TO THE POINT THAT THE THICKENER RAKE HAS BECOME INOPERABLE. TO SOLVE THE PROBLEM THE UTILITY HAS BEEN IMPROVING THE CHEMISTRY MONITORING SYSTEM. IN THE INTERIM, WHERE EXISTING MONITORS ARE OUT OF SERVICE, LAB PERSONNEL PERFORM MANUAL TESTS TO MAINTAIN PROCESS CHEMISTRY CONTROL.

THE BOILER AND THE FGD SYSTEM OPERATED THE ENTIRE MONTH OF SEPTEMBER WITH NO PROBLEMS.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SOUTHERN INDIANA GAS & ELEC	
PLANT NAME	A.B. BROWN	
UNIT NUMBER	1	
CITY	WEST FRANKLIN	
STATE	INDIANA	
GROSS UNIT GENERATING CAPACITY - MW	265.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	250.0	
EQUIVALENT SCRUBBED CAPACITY - MW	265.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	25819.	(11100 BTU/LB)
AVERAGE ASH CONTENT - %	9.40	
AVERAGE MOISTURE CONTENT - %	13.30	
AVERAGE SULFUR CONTENT - %	3.35	
AVERAGE CHLORIDE CONTENT - %	.05	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	DUAL ALKALI	
SYSTEM SUPPLIER	FMC	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	.8	
INITIAL START-UP DATE	3/79	
COMMERCIAL START-UP DATE	4/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	.3	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	NONE	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	99.0	96.5	99.1	96.4						
	B	99.0	99.0	99.1	99.0						
	SYSTEM	99.0	98.0	99.1	97.7			744	744	727	65.8

** PROBLEMS/SOLUTIONS/COMMENTS

SEVEN HOURS OF FGD SYSTEM FORCED OUTAGE TIME DURING JANUARY WERE CAUSED BY A THICKENER RAKE STALL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	99.1	70.3	98.8	69.4						
	B	98.4	70.0	97.8	68.7						
	SYSTEM	98.8	70.2	98.3	69.1			696	687	481	75.5

** PROBLEMS/SOLUTIONS/COMMENTS

SOME OUTAGE TIME IN FEBRUARY RESULTED FROM A WET SLUDGE PRODUCT. A CHEMICAL IMBALANCE CAUSED THE SLUDGE PROBLEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	98.7	64.8	95.2	26.5						
	B	99.2	51.6	96.3	21.1						
	SYSTEM	99.0	58.2	95.8	23.8			744	304	177	23.8

SOUTHERN INDIANA GAS & ELEC: A.B. BROWN 1 (CONT.)

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------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
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       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MARCH, BOILER DOWN TIME WAS DUE TO A SCHEDULED UNIT OUTAGE, DURING
                         WHICH TIME MAINTENANCE WAS PERFORMED ON THE SCRUBBER.

 4/80  A         100.0        96.8        100.0        92.9
       B         100.0        99.7        100.0        95.7
       SYSTEM    100.0        98.3        100.0        94.3                    720   691    679  58.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING APRIL, THERE WERE NO OPERATIONAL PROBLEMS WITH THE FGD SYSTEM.  THE
                         SYSTEM WAS AVAILABLE 100% OF THE TIME.

 5/80  A         100.0       100.0        100.0        82.8
       B         100.0       100.0        100.0        82.8
       SYSTEM    100.0       100.0        100.0        82.8                    744   604    616  53.7

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING MAY NO FORCED OUTAGES WERE EXPERIENCED WITH THE FGD SYSTEM.  THE
                         BOILER WAS OFF LINE FOR 140 HOURS DURING THE MONTH FOR GENERAL MAINTENANCE,
                         DURING WHICH TIME SOME GENERAL FGD SYSTEM MAINTENANCE WAS ALSO PERFORMED.

 6/80  A         100.0       100.0        100.0        98.2
       B         100.0       100.0        100.0        98.2
       SYSTEM    100.0       100.0        100.0        98.2                    720   706    707  55.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         NO FGD RELATED PROBLEMS WERE REPORTED FOR THE MONTH OF JUNE.  THE FGD
                         SYSTEM OPERATED 100% OF THE TIME THE BOILER WAS ON LINE.

 7/80  A          98.1        97.9         97.9        92.5
       B          86.8        87.7         87.7        82.9
       SYSTEM     92.4        92.8         92.8        87.7                    744   703    653  62.6

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE B MODULE RECIRCULATION PUMPS WERE THE MAJOR CAUSE OF DOWNTIME.  TWO
                         PIECES OF THE CHEVRON MIST ELIMINATOR FELL CAUSING THE SUCTION LINES TO
                         PLUG.

                         ADDITIONAL PROBLEMS WITH THE PUMP WERE CAUSED BY THE THRUST BEARING.  THIS
                         WAS CORRECTED BY THE MANUFACTURER.

                         THE UNAVAILABILITY OF THE VACUUM FILTERS AND ASSOCIATED EQUIPMENT REQUIRED
                         THE SCRUBBER TO SHUTDOWN TO AVOID A STOPPAGE OF THE THICKENER RAKE.  THIS
                         SITUATION ACCOUNTED FOR APPROXIMATELY 15 HOURS OF SYSTEM OUTAGE TIME
                         DURING JULY.

 8/80  A          94.5        94.5         94.5        94.5
       B          94.8        94.8         94.8        94.8
       SYSTEM     94.6        94.6         94.6        94.6                    744   744    704  61.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE MAJOR CAUSE OF UNAVAILABLITY FOR AUGUST WAS PROBLEMS WITH SOLIDS
                         DISPOSAL, INCLUDING PROBLEMS WITH PRIMARY LIQUID-SOLID SEPARATION UP TO
                         AND INCLUDING FINAL LANDFILLING.

 9/80  A         100.0        99.6         99.6        99.6
       B         100.0        99.6         99.6        99.6
       SYSTEM    100.0        99.6         99.6        99.6                    720   720    717  59.8
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--------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
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** PROBLEMS/SOLUTIONS/COMMENTS

SLUDGE DISPOSAL REMAINS THE MOST PREVALENT PROBLEM DUE TO MECHANICAL BREAKDOWN OF THE DISPOSAL TRUCKS AND UNDERFLOW PUMPS, IN ADDITION TO THE HIGH MAINTENANCE REQUIREMENTS OF THE ROTARY VACUUM FILTERS.

THE MONTH OF SEPTEMBER ALSO SAW AN EXTREMELY HIGH RATE OF FAILURE OF RECIRCULATION PUMPS, WITH DAMAGE TO THE RUBBER LINED CASINGS AND IMPELLERS. THE CAUSE OF THIS PROBLEM IS UNKNOWN TO THE UTILITY AT THIS POINT.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	SPRINGFIELD CITY UTILITIES	
PLANT NAME	SOUTHWEST	
UNIT NUMBER	1	
CITY	SPRINGFIELD	
STATE	MISSOURI	
GROSS UNIT GENERATING CAPACITY - MW	194.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	173.0	
EQUIVALENT SCRUBBED CAPACITY - MW	194.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	26749.	(11500 BTU/LB)
AVERAGE ASH CONTENT - %	13.00	
AVERAGE MOISTURE CONTENT - %	9.00	
AVERAGE SULFUR CONTENT - %	3.50	
AVERAGE CHLORIDE CONTENT - %	.30	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	4.6	
INITIAL START-UP DATE	4/77	
COMMERCIAL START-UP DATE	9/77	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.70	
ABSORBER SPARE CAPACITY INDEX - %	20.0	
ABSORBER SPARE COMPONENTS INDEX	.3	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	S-1	54.5	38.7	47.9	36.3						
	S-2	68.7	72.6	73.1	68.1						
	SYSTEM	61.6	55.7	60.5	52.2			744	698	388	65.4

** PROBLEMS/SOLUTIONS/COMMENTS

AT THE BEGINNING OF JANUARY AN S-1 ID FAN EXPANSION JOINT FAILED. THE BOILER WAS SHUTDOWN SOON AFTER FOR BOILER-RELATED PROBLEMS.

DURING THE LATTER PART OF THIS PERIOD THE S-1 MIST ELIMINATOR AND TRAP OUT TRAY HEADER FROZE. AFTER REPAIRS WERE MADE BOTH MODULES WERE PUT ON LINE. BOTH WERE KEPT RUNNING UNTIL JANUARY 20 WHEN A FLANGE BROKE LOOSE ON THE MIST ELIMINATOR HEADER.

AFTER MIST ELIMINATOR REPAIRS WERE COMPLETED THE S-1 MODULE OPERATED UNTIL JANUARY 27 WHEN FREEZING AIR LINES TO THE BALL MILLS PREVENTED THE USE OF BOTH MODULES DUE TO THE LACK OF SLURRY.

THE S-2 MODULE WAS ON LINE AT THE BEGINNING OF THE MONTH BUT DEVELOPED PRESATURATOR SPRAY NOZZLE PROBLEMS. WHILE THIS WAS BEING REPAIRED THE UNIT WAS TAKEN OFF LINE. APART FROM THIS TIME THE MODULE WAS ON LINE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	S-1	36.7	29.1	31.5	29.1						
	S-2	73.8	71.7	73.2	71.6						
	SYSTEM	55.3	50.4	52.4	50.4			696	695	350	59.9

SPRINGFIELD CITY UTILITIES: SOUTHWEST 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE S-1 MODULE WAS OUT OF SERVICE IN THE FIRST PART OF FEBRUARY DUE TO FROZEN AND BROKEN LINES. THE SUPERNATE LINE BROKE IN SEVERAL PLACES TAKING BOTH MODULES OUT OF SERVICE FOR SEVERAL DAYS. ONCE THIS WAS REPAIRED BOTH MODULES WERE IN SERVICE AS REQUIRED BY LOAD EXCEPT FOR A FEW MINOR TRIPS.

THE S-2 MODULE WAS EITHER IN SERVICE OR AVAILABLE FOR MOST OF THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	S-1	64.5	64.1	64.4	64.1						
	S-2	22.0	5.8	6.9	5.8						
	SYSTEM	43.3	35.0	35.7	35.0			744	744	260	57.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MARCH THE S-1 MODULE WAS OUT FOR 11 DAYS TO CLEAN THE ABSORBER SECTION.

THE S-2 MODULE WAS OUT OF SERVICE FOR CLEANING THE ABSORBER SECTIONS AND MIST ELIMINATORS FOR NEARLY ALL THE PERIOD BUT WAS AVAILABLE ON MARCH 25. IT WAS NOT OPERATED, HOWEVER, BECAUSE OF LOW UNIT LOAD DEMANDS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	S-1	78.2	69.1		59.6						
	S-2	15.1	6.9		6.0						
	SYSTEM	46.7	37.9	37.9	32.8			720	621	236	42.4

** PROBLEMS/SOLUTIONS/COMMENTS

THE S-1 MODULE EXPERIENCED SHORT OUTAGES DURING APRIL CAUSED BY SLURRY DRAW-OFF PUMP FAILURES AND MIST ELIMINATOR AND PRESATURATOR SPRAY SYSTEM PROBLEMS.

THE S-2 MODULE EXPERIENCED RECURRING HIGH FLUE GAS TEMPERATURE-RELATED PROBLEMS DURING THE MONTH. THIS WAS CORRECTED BY REPAIRING THE SCRUBBER INLET SCREEN.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	S-1	72.9	60.7	69.1	60.6						
	S-2	43.6	30.7	35.2	30.7						
	SYSTEM	58.3	45.7	52.2	45.7			744	744	340	56.7

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY THE S-1 SCRUBBER REQUIRED CLEANING.

PUMP AND PUMP CONTROL PROBLEMS ON THE S-1 SCRUBBING TRAIN OCCURRED DURING THE PERIOD.

THE S-2 MODULE WAS OFF LINE SEVERAL DAYS BECAUSE OF RECYCLE PUMP AND RECYCLE SYSTEM REPAIRS.

FLUE GAS OUTLET DUCT REPAIRS WERE REQUIRED ON THE S-2 MODULE IN MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	S-1	85.6	85.6	85.5	84.9						
	S-2	12.8	6.8	7.2	6.8						
	SYSTEM	49.2	45.8	47.4	45.8			720	720	330	66.6

** PROBLEMS/SOLUTIONS/COMMENTS

THE S-1 MODULE WAS IN CONTINUOUS SERVICE DURING JUNE WITH SHORT DURATION OUTAGES FOR CLEANING, CONTROL SYSTEM DAMAGE CAUSED BY LIGHTNING, AND OTHER MINOR MISCELLANEOUS PROBLEMS.

THE S-2 MODULE WAS OUT OF SERVICE FOR APPROXIMATELY 23 DAYS IN JUNE BECAUSE OF A BROKEN SLURRY HOLD TANK AGITATOR SHAFT.

IN ADDITION TO THE OUTAGE CAUSED BY THE BROKEN SHAFT, THE S-2 MODULE HAD SHORT DURATION OUTAGES CAUSED BY RECYCLE PUMP AGITATOR PROBLEMS, CONTROL SYSTEM PROGRAMMING, AND OTHER MINOR MISCELLANEOUS PROBLEMS.

SPRINGFIELD CITY UTILITIES: SOUTHWEST 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	S-1	80.5	69.6		69.5						
	S-2	57.0	39.0		39.0						
	SYSTEM	68.7	54.3	72.4	54.3			744	743	404	80.6

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JULY THE S-1 MODULE WAS CLEANED AND THE SPHERES WERE REPLACED.

THE S-1 MODULE DUCTWORK NEEDED REPAIR DURING JULY CAUSING SOME OUTAGE TIME.

THE SLUDGE DEWATERING FILTER BELT AND THE HOLD TANK BEARING FAILED ACCOUNTING FOR SOME OF THE S-1 MODULE DOWNTIME.

THE S-1 MODULE SPRAY CONTROL VALVE FAILED ADDING TO THE OUTAGE TIME.

HIGH FLUE GAS TEMPERATURE CONDITIONS RESULTED IN A SHUTDOWN OF BOTH THE FGD MODULES.

THE S-2 MODULE AGITATOR SHAFT IN THE HOLD TANK FAILED CAUSING THE MODULE TO COME OFF LINE.

PROBLEMS WERE ENCOUNTERED WITH THE SLURRY DRAW OFF PUMP, SUPERNATANT PUMP AND THE RECYCLE PUMP CAUSING THE S-2 MODULE TO SHUTDOWN.

A POWER SUPPLY EQUIPMENT FAILURE RESULTED IN A S-2 MODULE OUTAGE.

AN EXPANSION JOINT FAILURE OCCURRED ON THE S-2 MODULE SEAL AIR FAN.

A HIGH LEVEL CONDITION IN THE DRAW OFF SUMP WAS ALSO A CAUSE OF THE S-2 MODULE LOW AVAILABILITY. THE PROBLEMS EXPERIENCED WITH THE CONTROL SYSTEM CONTRIBUTED ALSO.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	S-1	73.7	67.4		67.4						
	S-2	71.9	55.4		55.4						
	SYSTEM	72.8	61.4	62.4	61.4			744	744	457	86.2

** PROBLEMS/SOLUTIONS/COMMENTS

THICKENER PROBLEMS ENCOUNTERED DURING AUGUST CAUSED BOTH MODULES TO SHUT DOWN FOR PART OF THE MONTH.

THE OUTLET DUCT EXPERIENCED LEAKAGE CAUSING SOME SYSTEM DOWN TIME.

THE S-1 MODULE DAMPER DRIVE FAILED CAUSED ADDITIONAL OUTAGE TIME.

THE LIMESTONE FEEDER FOR MODULE S-2 FAILED CAUSING THE S-2 MODULE TO SHUT DOWN FOR PART OF THE MONTH.

THE FGD SYSTEM WAS SHUT DOWN DURING PART OF THE MONTH SO THAT VALVE REPAIRS COULD BE MADE.

PROBLEMS WERE ENCOUNTERED WITH THE S-2 MODULE RECYCLE PUMP.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	S-1	78.5	85.8	87.4	78.5						
	S-2	57.5	.6	.2	.2						
	SYSTEM	68.0	43.2	43.8	39.4			720	658	283	80.3

** PROBLEMS/SOLUTIONS/COMMENTS

DURING SEPTEMBER, THE SCRUBBER OUTLET DUCTS EXPERIENCED LEAKING CAUSING THE SYSTEM TO SHUTDOWN FOR PART OF THE MONTH.

THE S-1 MODULE EXPERIENCED INLET DAMPER PROBLEMS.

THE RECYCLE SPRAY NOZZLES ON THE S-2 MODULE PLUGGED CAUSING ADDITIONAL OUTAGE TIME.

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                                         SECTION 3
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                         ST. JOE ZINC
PLANT NAME                                           G.F. WEATON
UNIT NUMBER                                          1
CITY                                                 MONACA
STATE                                                PENNSYLVANIA
GROSS UNIT GENERATING CAPACITY - MW                     60.0
NET UNIT GENERATING CAPACITY W/FGD - MW                 60.0
EQUIVALENT SCRUBBED CAPACITY - MW                       60.0

** FUEL DATA
   FUEL TYPE                                         COAL
   FUEL GRADE                                        BITUMINOUS
   AVERAGE HEAT CONTENT - J/G                         29075.        ( 12500 BTU/LB)
   AVERAGE ASH CONTENT - %                              11.50
   AVERAGE MOISTURE CONTENT - %                      ********
   AVERAGE SULFUR CONTENT - %                            2.00
   AVERAGE CHLORIDE CONTENT - %                           .20

** GENERAL EMISSION CONTROL SYSTEM DATA
   GENERAL PROCESS TYPE                              WET SCRUBBING
   PROCESS TYPE                                      CITRATE
   SYSTEM SUPPLIER                                   MORRISON & KNUDSEN/U.S.B.M.
   NEW/RETROFIT                                      RETROFIT
   ENERGY CONSUMPTION - %                            *******
   INITIAL START-UP DATE                             11/79
   COMMERCIAL START-UP DATE                           1/80
   SO2 DESIGN REMOVAL EFFICIENCY - %                    90.00
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %            99.60
   ABSORBER SPARE CAPACITY INDEX - %                      .0
   ABSORBER SPARE COMPONENTS INDEX                        .0

** WATER LOOP
   TYPE                                              CLOSED
   FRESH MAKE-UP WATER - LITER/S                     *******        (***** GPM)

** BYPRODUCT
   BYPRODUCT NATURE                                  ELEMENTAL SULFUR
   DISPOSITION


-----------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM
                                                                            744
 2/80  SYSTEM
                                                                            696
 3/80  SYSTEM
                                                                            744
      ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE SYSTEM IS STILL GOING THROUGH THE DEBUGGING PHASE OF OPERATION.  SOME
                        EQUIPMENT PROBLEMS HAVE OCCURRED, ESPECIALLY WITH THE HYDROGEN SULFIDE
                        GENERATOR AND HEAT EXCHANGERS, ONE OF WHICH HAD TO BE REMOVED AND RETURNED
                        TO THE MANUFACTURER.  NO OPERATING HOURS WERE LOGGED DURING THE FIRST
                        QUARTER OF 1980 BRINGING THE TOTAL SYSTEM OPERATING HOURS TO 42 IN 1979.
 4/80  SYSTEM
                                                                            720
 5/80  SYSTEM
                                                                            744
 6/80  SYSTEM
                                                                            720
      ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE GEORGE F. WHEATON STATION HAS BEEN OPERATING AT A REDUCED LOAD OF 20
                        TO 30 MW SINCE DECEMBER, 1979 DUE TO THF SHUTDOWN OF THE ST. JOE ZINC CO.
                        SMELTER.  ALTHOUGH A NUMBER OF TRIAL RUNS OF THE CITRATE DEMONSTRATION
                        PLANT HAVE BEEN MADE DURING THE PAST SIX MONTHS, MECHANICAL BREAKDOWNS OF
                        EQUIPMENT AND PROBLEMS RELATED TO LOW TEMPERATURE OPERATION HAVE PREVENTED
                        CONTINUOUS OPERATION TO OBTAIN MEANINGFUL DATA.  ST. JOE IS ATTEMPTING TO
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ST. JOE ZINC: G.F. WEATON 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

NEGOTIATE A POWER SALES AGREEMENT THAT WILL PERMIT FULL UTILIZATION OF THE STATION CAPACITY AND ALSO PROVIDE DESIGN FLUE GAS QUANTITIES TO THE DEMONSTRATION PLANT. OPERATION OF THE POWER PLANT AT THE DESIGN RATES IS REQUIRED FOR ACCEPTANCE AND DEMONSTRATION TESTING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE CITRATE PROCESS DID NOT OPERATE DURING THE MONTHS OF JULY AND AUGUST 1980.

NEGOTIATIONS TO PERMIT THE POWER PLANT TO OPERATE AT HIGHER RATES AND ALLOW THE DEMONSTRATION PLANT TEST PROGRAM TO PROCEED AS PLANNED ARE CONTINUING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

NEGOTIATIONS MENTIONED EARLIER CONTINUED THROUGH SEPTEMBER. MINIMAL FGD OPERATIONS WERE REPORTED FOR THE MONTH.

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                                              SECTION 3
                       DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS
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COMPANY NAME                                   TENNESSEE VALLEY AUTHORITY
PLANT NAME                                     SHAWNEE
UNIT NUMBER                                    10A
CITY                                           PADUCAH
STATE                                          KENTUCKY
GROSS UNIT GENERATING CAPACITY - MW               10.0
NET UNIT GENERATING CAPACITY W/FGD - MW           10.0
EQUIVALENT SCRUBBED CAPACITY - MW                 10.0

** FUEL DATA
    FUEL TYPE                                  COAL
    FUEL GRADE                                 BITUMINOUS
    AVERAGE HEAT CONTENT - J/G                 *******       ( ****** BTU/LB)
    AVERAGE ASH CONTENT - %                    ********
    AVERAGE MOISTURE CONTENT - %               ********
    AVERAGE SULFUR CONTENT - %                     2.90
    AVERAGE CHLORIDE CONTENT - %               ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                       WET SCRUBBING
    PROCESS TYPE                               LIME/LIMESTONE
    SYSTEM SUPPLIER                            AIR CORRECTION DIVISION, UOP
    NEW/RETROFIT                               RETROFIT
    ENERGY CONSUMPTION - %                     *******
    INITIAL START-UP DATE                       4/72
    COMMERCIAL START-UP DATE                   **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %             90.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %  ********
    ABSORBER SPARE CAPACITY INDEX - %                .0
    ABSORBER SPARE COMPONENTS INDEX                  .0

** WATER LOOP
    TYPE                                       CLOSED
    FRESH MAKE-UP WATER - LITER/S              *******         (***** GPM)


-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
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 3/80  SYSTEM

      ** PROBLEMS/SOLUTIONS/COMMENTS

                              REFER TO THE PERFORMANCE UPDATE INFORMATION FOR SHAWNEE 10B.
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COMPANY NAME	TENNESSEE VALLEY AUTHORITY	
PLANT NAME	SHAWNEE	
UNIT NUMBER	10B	
CITY	PADUCAH	
STATE	KENTUCKY	
GROSS UNIT GENERATING CAPACITY - MW	10.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	10.0	
EQUIVALENT SCRUBBED CAPACITY - MW	10.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	*******	(****** BTU/LB)
AVERAGE ASH CONTENT - %	********	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	2.90	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME/LIMESTONE	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/72	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980, ONLY THE VENTURI/SPRAY TOWER SYSTEM WAS OPERATED. THE TCA SYSTEM CONTINUED TO OPERATE DURING THE QUARTER ON DOWA BASIC ALUMINUM SULFATE PROCESS UNDER EPRI/UOP/TVA SPONSORSHIP.

THE LIMESTONE/ADIPIC ACID TEST SERIES ON THE VENTURI/SPRAY TOWER SYSTEM, WHICH HAD BEEN INITIATED IN MID-DECEMBER TO INVESTIGATE THE RELATIONSHIP BETWEEN THE SLURRY PH AND THE ADIPIC ACID CONSUMPTION (DEGRADATION) RATE, WAS COMPLETED IN MID-FEBRUARY. THE TESTS WERE CONDUCTED WITHOUT FORCED OXIDATION AND WITH A SINGLE HOLD TANK. AT THE SCRUBBER INLET PH OF 4.6 TO 5.0, ESSENTIALLY ALL OF THE ADIPIC ACID ADDED WAS ACCOUNTED FOR IN THE LIQUID PHASE OF THE WASTE SLUDGE DISCHARGED FROM THE SYSTEM. AT THE SCRUBBER INLET PH 5.25 AND 5.5, THE ADIPIC ACID UNACCOUNTED FOR WERE 6% AND 26% , RESPECTIVELY. THEREFORE, IT APPEARS THAT THE ADIPIC ACID (OR CARBOXYLIC ACID) DEGRADATION TAKES PLACE AT SCRUBBER INLET PH ABOVE ABOUT 5.1 UNDER CONDITIONS ASKED.

A SERIES OF LIMESTONE/ADIPIC ACID TESTS WERE CONDUCTED FROM MID-FEBRUARY TO EARLY MARCH USING THE VENTURI SCRUBBER ONLY WITH A SINGLE TANK AND WITHOUT FORCED OXIDATION TO INVESTIGATE THE SO2 REMOVAL CAPABILITY OF THE VENTURI AT 5.1 INLET PH AND HIGH ADIPIC ACID CONCENTRATION. AT 4000 PPM ADIPIC ACID, L/G OF 21 GAL/MCF, AND 8.3 INCHES H2O PRESSURE DROP, SO2 REMOVAL WAS 65% WITH 2200 PPM INLET SO2 CONCENTRATION.

FORCED OXIDATION USING A SINGLE TANK WITH LIMESTONE/ADIPIC ACID SLURRY ON THE VENTURI/SPRAY TOWER SYSTEM BEGAN IN MID-MARCH. AS IN THE CORRESPONDING TEST SERIES CONDUCTED ON TCA IN APRIL 1979, LIMESTONE BLINDING BY CALCIUM SULFITE OCCURRED. SOLUTION OF THE PROBLEM CAN BE EXPECTED BY USING TWO

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

TANKS IN SERIES WITH FORCED OXIDATION IN THE FIRST TANK AND LIMESTONE ADDITION IN THE SECOND. THIS MODE IS PLANNED ON BEING DEMONSTRATED NEXT QUARTER.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE VENTURI/SPRAY TOWER SYSTEM (TRAIN 100) WAS SHUT DOWN FROM MAY 28 THROUGH JUNE 17 FOR CONVERSION TO A SPRAY TOWER-ONLY SYSTEM BY THE PHYSICAL REMOVAL OF THE VENTURI SECTION. THE SPRAY TOWER-ONLY TESTING BEGAN JUNE 17 ON A SERIES OF LIMESTONE FACTORIAL TESTS, BOTH WITH AND WITHOUT FORCED OXIDATION, TO CHARACTERIZE THE EFFECTS OF LIQUID-TO-GAS RATIO AND SLURRY PH ON SO2 REMOVAL IN THE SPRAY TOWER (THE FIRST SPRAY TOWER-ONLY TESTING AT SHAWNEE).

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

TRAIN 100 WAS AGAIN SHUT DOWN FROM AUGUST 11-28 FOR MODIFICATION OF THE SLURRY PIPING AND INTERNAL HEADERS TO INCREASE THE SLURRY FLOW CAPACITY FROM 1600 TO 2400 GPM. TESTING RESUMED ON AUGUST 28 ON ANOTHER LIMESTONE FACTORIAL TEST SERIES WITH AND WITHOUT FORCED OXIDATION, BUT AT HIGHER LIQUID-TO-GAS RATIOS (UP TO 150 GAL/MCF AT 20,000 ACFM AT 300 F GAS RATE AND 2400 GPM MAXIMUM SLURRY FLOW RATE). THIS TEST SERIES IS EXPECTED TO BE COMPLETED BY MID OCTOBER.
TESTING OF THE TCA SYSTEM (TRAIN 200) RESUMED ON JULY 15 AFTER THE SYSTEM HAD BEEN RESTORED FROM THE DOWA PROCESS OPERATING MODE. AS PART OF THE EPA FULL-SCALE ADIPIC ACID DEMONSTRATION PROGRAM, THE SYSTEM HAD BEEN USED THROUGHOUT THE THIRD QUARTER TO SIMULATE THE OPERATION OF THE FULL-SCALE TCA UNITS OPERATING WITH LIMESTONE/ADIPTIC ACID SLURRY AT THE SOUTHWEST STATION OF THE SPRINGFIELD CITY UTILITIES, AT SPRINGFIELD MISSOURI. TESTS HAVE BEEN CONDUCTED BOTH WITH AND WITHOUT FORCED OXIDATION TO GENERATE INFORMATION USEFUL FOR THE FULL-SCALE DEMONSTRATION.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TENNESSEE VALLEY AUTHORITY	
PLANT NAME	WIDOWS CREEK	
UNIT NUMBER	8	
CITY	BRIDGEPORT	
STATE	ALABAMA	
GROSS UNIT GENERATING CAPACITY - MW	550.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	516.0	
EQUIVALENT SCRUBBED CAPACITY - MW	550.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	23260.	(10000 BTU/LB)
AVERAGE ASH CONTENT - %	25.00	
AVERAGE MOISTURE CONTENT - %	10.00	
AVERAGE SULFUR CONTENT - %	3.70	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	TENNESSEE VALLEY AUTHORITY	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	4.7	
INITIAL START-UP DATE	5/77	
COMMERCIAL START-UP DATE	1/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	70.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	70.4	79.8		39.2						
	B	83.5	100.0		56.3						
	C	100.0	100.0		55.5						
	D	28.3	54.7		26.9						
	SYSTEM	70.6	83.6		44.5	83.60		744	366	331	23.9

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE UNIT 8 BOILER EXPERIENCED LOW AVAILABILITY, CAUSING THE FORCED OXIDATION TESTS TO BE DISCONTINUED UNTIL AFTER THE SCHEDULED MAINTENANCE OUTAGE WHICH WILL BEGIN IN SEPTEMBER 1980. THE FORCED OXIDATION TESTS ARE EXPECTED TO RESUME IN JANUARY 1981.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	A	80.0	88.6		72.7						
	B	86.5	90.2		74.0						
	C	91.1	97.6		80.0						
	D	87.6	98.2		80.6						
	SYSTEM	86.3	93.7		76.8	84.00		696	571	535	43.6

** PROBLEMS/SOLUTIONS/COMMENTS

BY FEBRUARY 27, 1980, THE DIFFERENTIAL PRESSURE ACROSS THE TRAIN C ABSORBER HAD REACHED 19 INCHES WATER GAGE. THE HIGH ABSORBER DIFFERENTIAL PRESSURE WAS CAUSED BY PLUGGING OF TURBULENT CONTACT ABSORBER (TCA) SPHERES WHICH WERE INSTALLED DURING SCRUBBER OPTIMIZATION TESTS. THE TCA SPHERES WILL BE REMOVED IN MARCH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	A	93.6	88.0		85.4						
	B	93.0	90.6		87.9						
	C	71.9	73.3		71.1						
	D	93.3	63.9		62.0						
	SYSTEM	86.0	79.0		76.6	82.60		744	722	570	50.4

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ON MARCH 3 THE TCA SPHERES INSTALLED IN TRAIN C AS PART OF THE OPTIMIZATION TESTS WERE REMOVED. THE SPHERES HAD BECOME PLUGGED, RESULTING IN AN ABSORBER DIFFERENTIAL PRESSURE OF 20 INCHES WATER GAGE. THE SPHERES HAD BEEN IN USE SINCE NOVEMBER 17, 1979.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	A	96.8	82.7		46.5						
	B	97.2	79.5		44.7						
	C	96.3	90.4		50.8						
	D	95.0	70.9		39.9						
	SYSTEM	96.3	80.9		45.5	86.00		720	405	328	30.3

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER SLURRY SPRAY NOZZLES WERE CLEANED AS PART OF A SCHEDULED MAINTENANCE OUTAGE.

BALL MILL LINERS AND LIFTER BARS WERE REPLACED IN APRIL DURING A SCHEDULED MAINTENANCE OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	99.2	74.5		56.2						
	B	96.1	80.9		61.0						
	C	96.1	87.7		66.1						
	D	96.1	75.2		56.7						
	SYSTEM	96.9	79.6		60.0	83.00		744	561	447	38.3

** PROBLEMS/SOLUTIONS/COMMENTS

ON MAY 16 THE LIMESTONE BUCKET ELEVATOR FAILED CAUSING UNIT 8 TO BE REMOVED FROM SERVICE FOR SIX HOURS.

THE SCRUBBER SLURRY SPRAY NOZZLES ON THE B, C AND D MODULES WERE CLEANED DURING MAY. THE CLEANING KEPT THE SYSTEM OFF LINE FOR 23 HOURS.

THE UNIT 8 BALL MILL MALFUNCTIONED ON MAY 28, DUE TO FAILURE OF INLET BEARING BOLTS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	100.0	5.3	100.0	4.9						
	B	100.0	100.0	100.0	91.8						
	C	99.6	93.9	99.5	86.3						
	D	100.0	98.6	100.0	90.6						
	SYSTEM	99.9	74.5	99.8	68.3	82.20		720	661	492	44.0

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE BALL MILL REMAINED OUT OF SERVICE FOR MAJOR REPAIRS THAT INCLUDED REPAIR OF THE BALL MILL SHELL (CRACKS PRESENT). THE UNIT 7 SCRUBBER BALL MILL WAS USED IN PLACE OF THE UNIT 8 BALL MILL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	A	100.0	79.9	100.0	71.6						
	B	96.9	75.1	95.6	67.3						
	C	96.9	88.3	96.2	79.2						
	D	100.0	48.7	100.0	43.7						
	SYSTEM	98.5	73.0	98.0	65.5	87.40		744	667	487	43.7

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT 8 BALL MILL SHELL WAS SHIPPED TO THE FACTORY FOR REPAIRS ON JULY 24.

CLEANING OF THE SLURRY SPRAY NOZZLES REMAINS A SIGNIFICANT SCRUBBER MAINTENANCE ITEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

TENNESSEE VALLEY AUTHORITY: WIDOWS CREEK 8 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

INFORMATION FOR THE MONTHS OF AUGUST AND SEPTEMBER IS NOT AVAILABLE AT THIS TIME.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TEXAS UTILITIES	
PLANT NAME	MARTIN LAKE	
UNIT NUMBER	1	
CITY	TATUM	
STATE	TEXAS	
GROSS UNIT GENERATING CAPACITY - MW	793.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	750.0	
EQUIVALENT SCRUBBED CAPACITY - MW	595.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	17166.	(7380 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	33.00	
AVERAGE SULFUR CONTENT - %	.90	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.3	
INITIAL START-UP DATE	4/77	
COMMERCIAL START-UP DATE	10/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	71.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.40	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	34.6	(550 GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING PROBLEMS CONTINUED IN THE FIRST QUARTER OF 1980, PARTICULARLY IN THE WETTED FILM CONTACT AREA AND THE MIST ELIMINATOR SECTION. THE MIST ELIMINATOR PLUGGING WAS RECENTLY SOLVED BY SWITCHING BACK TO LAKE WATER FOR MIST ELIMINATOR WASH FROM AN ASH POND WATER WASH THEY HAD BEEN TESTING.

THE FRP STRUCTURAL WORK IS BECOMING A PROBLEM. MUCH OF THE FRP SUPPORT WORK WAS REPLACED WITH STAINLESS STEEL.

THE UTILITY HAS PLANS TO INSTALL TWO NEW SCRUBBING TOWERS IN EARLY 1982. THE NEW TOWERS HAVE BECOME NECESSARY DUE TO THE INCREASING LIGNITE SULFUR CONTENT AND THE NEED FOR SPARE SCRUBBER CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

TEXAS UTILITIES: MARTIN LAKE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

HIGH MAINTENANCE PROBLEMS REPORTED IN PREVIOUS MONTHS CONTINUED THROUGHOUT THE SECOND QUARTER OF 1980. THE ABSORBERS ARE STILL EXPERIENCING PLUGGING PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

CORROSION IN THE SCRUBBER MODULES WAS A PROBLEM DURING JULY.

THE FOUNDATION FOR THE TWO NEW SCRUBBING TOWERS WAS COMPLETED DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED WITHOUT ANY MAJOR PROBLEMS DURING AUGUST AND SEPTEMBER.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TEXAS UTILITIES	
PLANT NAME	MARTIN LAKE	
UNIT NUMBER	2	
CITY	TATUM	
STATE	TEXAS	
GROSS UNIT GENERATING CAPACITY - MW	793.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	750.0	
EQUIVALENT SCRUBBED CAPACITY - MW	595.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	17166.	(7380 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	33.00	
AVERAGE SULFUR CONTENT - %	.90	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.3	
INITIAL START-UP DATE	5/78	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	71.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.40	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	34.6	(550 GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING PROBLEMS CONTINUED IN THE FIRST QUARTER OF 1980, PARTICULARLY IN THE WETTED FILM CONTACT AREA AND THE MIST ELIMINATOR SECTION. THE MIST ELIMINATOR PLUGGING WAS RECENTLY SOLVED BY SWITCHING BACK TO LAKE WATER FOR MIST ELIMINATOR WASH FROM AN ASH POND WATER WASH THEY HAD BEEN TESTING.

THE FRP STRUCTURAL WORK IS BECOMING A PROBLEM. MUCH OF THE FRP SUPPORT WORK WAS REPLACED WITH STAINLESS STEEL.

THE UTILITY HAS PLANS TO INSTALL TWO NEW SCRUBBING TOWERS IN EARLY 1983. THE NEW TOWERS HAVE BECOME NECESSARY DUE TO THE INCREASING LIGNITE SULFUR CONTENT AND THE NEED FOR SPARE SCRUBBER CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

TEXAS UTILITIES: MARTIN LAKE 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

HIGH MAINTENANCE PROBLEMS REPORTED IN PREVIOUS MONTHS CONTINUED THROUGHOUT THE SECOND QUARTER OF 1980. THE ABSORBERS ARE STILL EXPERIENCING PLUGGING PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

CORROSION IN THE SCRUBBER MODULES WAS A PROBLEM DURING JULY.

THE FOUNDATION FOR THE 2 NEW SCRUBBING TOWERS WAS COMPLETED DURING THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED WITHOUT ANY MAJOR PROBLEMS DURING AUGUST AND SEPTEMBER.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	TEXAS UTILITIES	
PLANT NAME	MARTIN LAKE	
UNIT NUMBER	3	
CITY	TATUM	
STATE	TEXAS	
GROSS UNIT GENERATING CAPACITY - MW	793.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	750.0	
EQUIVALENT SCRUBBED CAPACITY - MW	595.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	17166.	(7380 BTU/LB)
AVERAGE ASH CONTENT - %	8.00	
AVERAGE MOISTURE CONTENT - %	33.00	
AVERAGE SULFUR CONTENT - %	.90	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.3	
INITIAL START-UP DATE	2/79	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	71.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.40	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

PLUGGING PROBLEMS CONTINUED IN THE FIRST QUARTER OF 1980, PARTICULARLY IN THE WETTED FILM CONTACT AREA AND THE MIST ELIMINATOR SECTION. THE MIST ELIMINATOR PLUGGING WAS RECENTLY SOLVED BY SWITCHING BACK TO LAKE WATER FOR MIST ELIMINATOR WASH FROM AN ASH POND WATER WASH THEY HAD BEEN TESTING.

THE FRP STRUCTURAL WORK IS BECOMING A PROBLEM. MUCH OF THE FRP SUPPORT WORK WAS REPLACED WITH STAINLESS STEEL.

THE UTILITY HAS PLANS TO INSTALL TWO NEW SCRUBBING TOWERS IN EARLY 1983. THE NEW TOWERS HAVE BECOME NECESSARY DUE TO THE INCREASING LIGNITE SULFUR CONTENT AND THE NEED FOR SPARE SCRUBBER CAPACITY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

TEXAS UTILITIES: MARTIN LAKE 3 (CONT.)

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------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            HIGH MAINTENANCE PROBLEMS REPORTED IN PREVIOUS MONTHS CONTINUED THROUGHOUT
                            THE SECOND QUARTER OF 1980.  THE ABSORBERS ARE STILL EXPERIENCING PLUGGING
                            PROBLEMS.

 7/80  SYSTEM                                                                744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            CORROSION IN THE SCRUBBER MODULES WAS A PROBLEM DURING JULY.

                            THE FOUNDATION FOR THE 2 NEW SCRUBBING TOWERS WAS COMPLETED DURING THE
                            MONTH.

 8/80  SYSTEM                                                                744

 9/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                            THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED WITHOUT ANY MAJOR
                            PROBLEMS DURING AUGUST AND SEPTEMBER.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                        TEXAS UTILITIES
PLANT NAME                                          MONTICELLO
UNIT NUMBER                                         3
CITY                                                MT. PLEASANT
STATE                                               TEXAS
GROSS UNIT GENERATING CAPACITY - MW                   800.0
NET UNIT GENERATING CAPACITY W/FGD - MW               750.0
EQUIVALENT SCRUBBED CAPACITY - MW                     800.0

** FUEL DATA
   FUEL TYPE                                        COAL
   FUEL GRADE                                       LIGNITE
   AVERAGE HEAT CONTENT - J/G                       *******        (****** BTU/LB)
   AVERAGE ASH CONTENT - %                            18.90
   AVERAGE MOISTURE CONTENT - %                       31.90
   AVERAGE SULFUR CONTENT - %                          1.50
   AVERAGE CHLORIDE CONTENT - %                         .04

** GENERAL EMISSION CONTROL SYSTEM DATA
   GENERAL PROCESS TYPE                             WET SCRUBBING
   PROCESS TYPE                                     LIMESTONE
   SYSTEM SUPPLIER                                  CHEMICO DIVISION, ENVIROTECH
   NEW/RETROFIT                                     NEW
   ENERGY CONSUMPTION - %                           *******
   INITIAL START-UP DATE                             5/78
   COMMERCIAL START-UP DATE                         10/78
   SO2 DESIGN REMOVAL EFFICIENCY - %                  74.00
   PARTICULATE DESIGN REMOVAL EFFICIENCY - %          99.50
   ABSORBER SPARE CAPACITY INDEX - %                    .0
   ABSORBER SPARE COMPONENTS INDEX                      .0

** WATER LOOP
   TYPE                                             CLOSED
   FRESH MAKE-UP WATER - LITER/S                      34.4        (  546 GPM)

** TREATMENT
   TYPE                                             FLYASH STABILIZATION

** DISPOSAL
   TYPE                                             LANDFILL


----------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS  HOURS HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  SYSTEM
                                                                             744
 2/80  SYSTEM
                                                                             696
 3/80  SYSTEM
                                                                             744
        ** PROBLEMS/SOLUTIONS/COMMENTS

                          NO PROBLEMS WERE ENCOUNTERED DURING THE FIRST QUARTER OF 1980.
 4/80  SYSTEM
                                                                             720
 5/80  SYSTEM
                                                                             744
 6/80  SYSTEM
                                                                             720
        ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE MONTICELLO 3 SCRUBBING SYSTEM PERFORMED WELL THROUGHOUT THE SECOND
                          QUARTER OF 1980.  THE TEXAS AIR CONTROL BOARD REPORTED THAT IT HAD RECEIVED
                          VERY FEW EXCESS EMISSIONS REPORTS FROM THE STATION DURING THE APRIL-JUNE
                          PERIOD.
 7/80  SYSTEM
                                                                             744
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TEXAS UTILITIES: MONTICELLO 3 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO MAJOR FGD-RELATED PROBLEMS WERE ENCOUNTERED DURING JULY.

 8/80  SYSTEM                                                                744

 9/80  SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE UTILITY REPORTED THAT THE RECYCLE PUMP LININGS HAVE BEEN A CONTINUAL
                           PROBLEM DURING AUGUST AND SEPTEMBER.  AT ONE TIME DURING THE TWO MONTH
                           PERIOD THREE RECYCLE PUMP LINERS FAILED.

                           THE FGD SYSTEM CONTINUES TO PERFORM WELL AND IS IN COMPLIANCE MORE THAN
                           95% OF THE TIME.
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SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	UTAH POWER & LIGHT	
PLANT NAME	HUNTER	
UNIT NUMBER	1	
CITY	CASTLE DALE	
STATE	UTAH	
GROSS UNIT GENERATING CAPACITY - MW	400.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
EQUIVALENT SCRUBBED CAPACITY - MW	360.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	29075.	(12500 BTU/LB)
AVERAGE ASH CONTENT - %	10.00	
AVERAGE MOISTURE CONTENT - %	6.50	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	.00	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	5/79	
COMMERCIAL START-UP DATE	5/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	*******	(***** GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	POND	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM		100.0		95.6			744	711	711	
11/79	SYSTEM		100.0		91.1			720	656	656	
12/79	SYSTEM		100.0		98.2			744	731	731	
1/80	SYSTEM		100.0		95.9			744	713	713	
2/80	SYSTEM		100.0		86.8			696	604	604	

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THERE WERE NO MAJOR FGD PROBLEMS ENCOUNTERED FROM OCTOBER 1979 THROUGH FEBRUARY 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM		57.8		56.9			744	732	423	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM WAS FORCED OF SERVICE IN MARCH BECAUSE THE THICKENER RAKE SHAFT FAILED AND THE TANK HAD TO BE DRAINED. THIS OUTAGE KEPT THE SYSTEM DOWN FOR APPROXIMATELY 309 HOURS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM		100.0		60.1			720	433	433	
5/80	SYSTEM		100.0		64.0			744	476	476	

UTAH POWER & LIGHT: HUNTER 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ---- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE LOW FGD HOURS DURING APRIL AND MAY RESULTED FROM THE ANNUAL OUTAGE
                          FOR GENERAL FGD SYSTEM MAINTENANCE.

 6/80  SYSTEM                100.0                    97.9                         720   705    705

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          NO FGD SYSTEM PROBLEMS WERE REPORTED FOR JUNE.

 7/80  SYSTEM                100.0                   100.0                         744   744    744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING JULY.

 8/80  SYSTEM     100.0                                                            744   744

 9/80             100.0
       SYSTEM                                                                      720   713

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE UTILITY REPORTED THAT NO MAJOR FGD PROBLEMS WERE ENCOUNTERED DURING
                          THE MONTHS OF AUGUST AND SEPTEMBER.
```

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

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COMPANY NAME                                     UTAH POWER & LIGHT
PLANT NAME                                       HUNTER
UNIT NUMBER                                      2
CITY                                             CASTLE DALE
STATE                                            UTAH
REGULATORY CLASSIFICATION                        B
PARTICULATE EMISSION LIMITATION - NG/J             43.         (  .100 LB/MMBTU)
SO2 EMISSION LIMITATION - NG/J                    516.         ( 1.200 LB/MMBTU)
NET PLANT GENERATING CAPACITY - MW               *******
GROSS UNIT GENERATING CAPACITY - MW                400.0
NET UNIT GENERATING CAPACITY W/FGD - MW            400.0
NET UNIT GENERATING CAPACITY WO/FGD - MW         *******
EQUIVALENT SCRUBBED CAPACITY - MW                  360.0

** BOILER DATA
    SUPPLIER                                     COMBUSTION ENGINEERING
    TYPE                                         PULVERIZED COAL
    SERVICE LOAD                                 BASE
    COMMERCIAL SERVICE DATE                       4/80
    MAXIMUM BOILER FLUE GAS FLOW - CU.M/S        ********      (******* ACFM)
    FLUE GAS TEMPERATURE - C                     *******       (**** F)
    STACK HEIGHT - M                             ******        (**** FT)
    STACK TOP DIAMETER - M                       *******       (***** FT)

** FUEL DATA
    FUEL TYPE                                    COAL
    FUEL GRADE                                   ******
    AVERAGE HEAT CONTENT - J/G                    29075.       ( 12500 BTU/LB)
    RANGE HEAT CONTENT - BTU/LB                                 12,200 - 12,700
    AVERAGE ASH CONTENT - %                          10.00
    RANGE ASH CONTENT - %                        9 - 12
    AVERAGE MOISTURE CONTENT - %                      6.50
    RANGE MOISTURE CONTENT - %                   ******
    AVERAGE SULFUR CONTENT - %                         .55
    RANGE SULFUR CONTENT - %                     ******
    AVERAGE CHLORIDE CONTENT - %                 ********
    RANGE CHLORIDE CONTENT - %                   ******

** GENERAL EMISSION CONTROL SYSTEM DATA
    SALEABLE PRODUCT/THROWAWAY PRODUCT           THROWAWAY PRODUCT
    GENERAL PROCESS TYPE                         WET SCRUBBING
    PROCESS TYPE                                 LIME
    SYSTEM SUPPLIER                              CHEMICO DIVISION, ENVIROTECH
    A-E FIRM                                     STEARNS-ROGER
    DEVELOPMENT LEVEL                            FULL SCALE
    NEW/RETROFIT                                 NEW
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       99.50
    SO2 DESIGN REMOVAL EFFICIENCY - %               80.00
    COMMERCIAL DATE                               6/80
    INITIAL START-UP                              6/80

** ESP
    NUMBER                                        1
    SUPPLIER                                     BUELL
    FLUE GAS CAPACITY - CU.M/S                     886.2       (1878000 ACFM)
    FLUE GAS TEMPERATURE - C                       127.8       (  262 F)

** PARTICLE SCRUBBER
    TYPE                                         NONE

** ABSORBER
    TYPE                                         SPRAY TOWER
    INITIAL START UP                              6/80
    SUPPLIER                                     CHEMICO DIVISION, ENVIROTECH

** MIST ELIMINATOR
    TYPE                                         CHEVRON

** REHEATER
    TYPE                                         HOT AIR INJECTION

** REHEATER
    TYPE                                         BYPASS
```

UTAH POWER & LIGHT: HUNTER 2 (CONT.)

** WATER LOOP TYPE	OPEN
** TREATMENT TYPE	FLYASH STABILIZATION
** DISPOSAL NATURE	FINAL
TYPE	POND
LOCATION	ON SITE

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM		100.0		99.5			720	717	717	

** PROBLEMS/SOLUTIONS/COMMENTS

INITIAL AND COMMERCIAL OPERATIONS AT HUNTER 2 BEGAN IN JUNE. NO MAJOR STARTUP PROBLEMS WITH THE FGD SYSTEM WERE ENCOUNTERED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM		100.0		98.9			744	736	736	

** PROBLEMS/SOLUTIONS/COMMENTS

NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING JULY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM	99.7						744	743		
9/80	SYSTEM	100.0						720	720		

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR FGD PROBLEMS WERE ENCOUNTERED DURING AUGUST AND SEPTEMBER.

SECTION 3
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL DOMESTIC FGD SYSTEMS

COMPANY NAME	UTAH POWER & LIGHT	
PLANT NAME	HUNTINGTON	
UNIT NUMBER	1	
CITY	PRICE	
STATE	UTAH	
GROSS UNIT GENERATING CAPACITY - MW	430.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	400.0	
EQUIVALENT SCRUBBED CAPACITY - MW	366.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	BITUMINOUS	
AVERAGE HEAT CONTENT - J/G	29075.	(12500 BTU/LB)
AVERAGE ASH CONTENT - %	10.00	
AVERAGE MOISTURE CONTENT - %	6.50	
AVERAGE SULFUR CONTENT - %	.55	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIME	
SYSTEM SUPPLIER	CHEMICO DIVISION, ENVIROTECH	
NEW/RETROFIT	NEW	
ENERGY CONSUMPTION - %	1.6	
INITIAL START-UP DATE	5/78	
COMMERCIAL START-UP DATE	5/78	
SO2 DESIGN REMOVAL EFFICIENCY - %	80.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	99.50	
ABSORBER SPARE CAPACITY INDEX - %	.0	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	CLOSED	
FRESH MAKE-UP WATER - LITER/S	18.9	(300 GPM)
** TREATMENT		
TYPE	FLYASH STABILIZATION	
** DISPOSAL		
TYPE	LANDFILL	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM							744	497		

** PROBLEMS/SOLUTIONS/COMMENTS

ON OCTOBER 15 FGD OPERATIONS WITH LIMESTONE WERE INITIATED FOR TESTING PURPOSES. IF THE FGD SYSTEM OPERATIONS ARE ADEQUATE WITH LIMESTONE THE UTILITY WILL STUDY THE ECONOMIC TRADEOFFS OF LIME VS LIMESTONE SUCH AS PUMP WEAR ETC. IF THE RESULTS FAVOR LIMESTONE THE HUNTINGTON 1 FGD SYSTEM MAY BE SHIFTED FROM LIME TO LIMESTONE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
11/79	SYSTEM							720	28		
12/79	SYSTEM							744	642		
1/80	SYSTEM							744	668		

** PROBLEMS/SOLUTIONS/COMMENTS

DUE TO A LACK OF RECORDS, DATA CONCERNING THE FGD SYSTEM OPERATIONS WAS UNAVAILABLE FOR THE MONTHS OF OCTOBER 1979 THROUGH JANUARY 1980. IN NOVEMBER THE BOILER WAS DOWN MOST OF THE MONTH FOR A SCHEDULED UNIT OVERHAUL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM		100.0		87.0			696	605	605	
3/80	SYSTEM		100.0		89.2			744	664	664	

UTAH POWER & LIGHT: HUNTINGTON 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                               SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 4/80  SYSTEM                 98.1                    92.1                    720   676    663

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM OPERATED ALONG WITH THE BOILER DURING FEBRUARY AND MARCH
                           WITH NO MAJOR PROBLEMS.

 5/80  SYSTEM                100.0                    99.7                    744   742    742

 6/80  SYSTEM                100.0                    99.2                    720   714    714

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM OPERATED ALONG WITH THE BOILER DURING THE APRIL THROUGH
                           JUNE PERIOD EXCEPT FOR A FEW HOURS IN APRIL.  THE UTILITY REPORTED THAT
                           NO MAJOR PROBLEMS OCCURRED DURING THIS TIME.

 7/80  SYSTEM                100.0                    87.2                    744   649    649

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO MAJOR FGD-RELATED PROBLEMS WERE REPORTED DURING JULY.

 8/80  SYSTEM      100.0                                                      744   695

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           NO MAJOR OPERATIONAL PROBLEMS WERE REPORTED IN AUGUST.

 9/80  SYSTEM         .0                                                      720     0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE FGD SYSTEM AND BOILER WERE DOWN THROUGHOUT SEPTEMBER FOR A SCHEDULED
                           MAINTENANCE OVERHAUL.
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SECTION 4
SUMMARY OF FGD SYSTEMS BY COMPANY

	TOTAL		STATUS							
			OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED		PLANNED	
COMPANY NAME	NO.	MW	NO.	MW	NO.	MW	NO.	MW	NO.	MW
ALABAMA ELECTRIC COOP	2	358.	2	358.	0	0.	0	0.	0	0.
ARIZONA ELECTRIC POWER COOP	2	196.	2	196.	0	0.	0	0.	0	0.
ARIZONA PUBLIC SERVICE	8	2598.	5	962.	1	126.	2	1510.	0	0.
ASSOCIATED ELECTRIC COOP	1	670.	0	0.	1	670.	0	0.	0	0.
ATLANTIC CITY ELECTRIC	1	330.	0	0.	0	0.	0	0.	1	330.
BASIN ELECTRIC POWER COOP	5	2590.	1	570.	3	1580.	0	0.	1	440.
BIG RIVERS ELECTRIC	4	1364.	1	242.	1	242.	2	880.	0	0.
CAJUN ELECTRIC POWER COOP	1	540.	0	0.	0	0.	0	0.	1	540.
CENTRAL ILLINOIS LIGHT	2	866.	1	416.	0	0.	0	0.	1	450.
CENTRAL ILLINOIS PUBLIC SERV	1	617.	1	617.	0	0.	0	0.	0	0.
CENTRAL MAINE POWER	1	600.	0	0.	0	0.	0	0.	1	600.
CENTRAL POWER & LIGHT	1	720.	0	0.	0	0.	0	0.	1	720.
CINCINNATI GAS & ELECTRIC	2	1300.	0	0.	1	650.	0	0.	1	650.
COLORADO UTE ELECTRIC ASSN	3	1294.	1	400.	1	447.	1	447.	0	0.
COLUMBUS & SOUTHERN OHIO ELEC	4	1572.	2	822.	0	0.	0	0.	2	750.
COMMONWEALTH EDISON	1	450.	1	450.	0	0.	0	0.	0	0.
COOPERATIVE POWER ASSOCIATION	2	654.	2	654.	0	0.	0	0.	0	0.
DELMARVA POWER & LIGHT	4	730.	3	180.	0	0.	0	0.	1	550.
DESERET GEN & TRANS COOP	2	820.	0	0.	0	0.	1	410.	1	410.
DUQUESNE LIGHT	2	918.	2	918.	0	0.	0	0.	0	0.
EAST KENTUCKY POWER COOP	3	1800.	0	0.	1	500.	0	0.	2	1300.
GENERAL PUBLIC UTILITIES	6	3880.	0	0.	0	0.	0	0.	6	3880.
GRAND HAVEN BRD OF LIGHT & PWR	1	65.	0	0.	1	65.	0	0.	0	0.
HOOSIER ENERGY	2	882.	0	0.	2	882.	0	0.	0	0.
HOUSTON LIGHTING & POWER	3	1992.	0	0.	1	492.	0	0.	2	1500.
INDIANAPOLIS POWER & LIGHT	5	3012.	1	532.	1	530.	0	0.	3	1950.
IOWA ELECTRIC LIGHT & PWR	1	720.	0	0.	0	0.	0	0.	1	720.
JACKSONVILLE ELEC AUTHORITY	2	1200.	0	0.	0	0.	0	0.	2	1200.
KANSAS CITY POWER & LIGHT	3	1000.	3	1000.	0	0.	0	0.	0	0.
KANSAS POWER & LIGHT	4	1575.	4	1575.	0	0.	0	0.	0	0.
KENTUCKY UTILITIES	1	64.	1	64.	0	0.	0	0.	0	0.
LAKELAND UTILITIES	1	364.	0	0.	1	364.	0	0.	0	0.
LANSING BOARD OF WATER & LIGHT	1	160.	0	0.	0	0.	0	0.	1	160.
LOS ANGELES DEPT OF WTR & PWR	4	3280.	0	0.	0	0.	0	0.	4	3280.
LOUISVILLE GAS & ELECTRIC	10	3554.	5	1201.	3	1203.	0	0.	2	1150.
MARQUETTE BOARD OF LIGHT & PWR	1	44.	0	0.	0	0.	0	0.	1	44.
MICHIGAN SO CENTRAL PWR AGENCY	1	55.	0	0.	0	0.	1	55.	0	0.
MIDDLE SOUTH UTILITIES	6	5340.	0	0.	0	0.	0	0.	6	5340.
MINNESOTA POWER & LIGHT	1	475.	1	475.	0	0.	0	0.	0	0.
MINNKOTA POWER COOPERATIVE	1	185.	1	185.	0	0.	0	0.	0	0.
MONONGAHELA POWER	2	1236.	1	618.	1	618.	0	0.	0	0.
MONTANA POWER	4	2120.	2	720.	2	1400.	0	0.	0	0.
MONTANA-DAKOTA UTILITIES	1	440.	0	0.	1	440.	0	0.	0	0.
MUSCATINE POWER & WATER	1	166.	0	0.	0	0.	1	166.	0	0.
NEBRASKA PUBLIC POWER DISTRICT	1	650.	0	0.	0	0.	0	0.	1	650.
NEVADA POWER	10	3215.	3	375.	0	0.	0	0.	7	2840.
NEW YORK STATE ELEC & GAS	1	625.	0	0.	0	0.	0	0.	1	625.
NIAGARA MOHAWK POWER COOP	1	100.	0	0.	1	100.	0	0.	0	0.
NORTHERN INDIANA PUB SERVICE	3	957.	1	115.	0	0.	2	842.	0	0.
NORTHERN STATES POWER	3	1590.	2	1480.	1	110.	0	0.	0	0.
PACIFIC GAS & ELECTRIC	2	1600.	0	0.	0	0.	0	0.	2	1600.
PACIFIC POWER & LIGHT	4	2200.	1	550.	0	0.	0	0.	3	1650.
PENNSYLVANIA POWER	3	2751.	3	2751.	0	0.	0	0.	0	0.
PHILADELPHIA ELECTRIC	3	724.	0	0.	2	574.	1	150.	0	0.
PLAINS ELECTRIC G & T COOP	1	233.	0	0.	0	0.	1	233.	0	0.
PLATTE RIVER POWER AUTHORITY	1	279.	0	0.	0	0.	1	279.	0	0.
PUBLIC SERVICE INDIANA	1	650.	0	0.	1	650.	0	0.	0	0.
PUBLIC SERVICE OF NEW MEXICO	4	1779.	3	1245.	1	534.	0	0.	0	0.
PWR AUTHORITY OF STATE OF NY	1	700.	0	0.	0	0.	0	0.	1	700.
SALT RIVER PROJECT	3	840.	2	560.	0	0.	0	0.	1	280.
SAN MIGUEL ELECTRIC COOP	1	400.	0	0.	1	400.	0	0.	0	0.
SEMINOLE ELECTRIC	2	1240.	0	0.	0	0.	2	1240.	0	0.
SIKESTON BRD OF MUNICIPAL UTIL	1	235.	0	0.	1	235.	0	0.	0	0.
SOUTH CAROLINA PUBLIC SERVICE	5	1700.	2	420.	1	280.	2	1000.	0	0.
SOUTH MISSISSIPPI ELEC PWR	2	248.	2	248.	0	0.	0	0.	0	0.

NOTE - PLANNED STATUS INCLUDES LETTER OF INTENT SIGNED, REQUESTING/EVALUTING BIDS, AND CONSIDERING ONLY FGD SYSTEMS

SECTION 4
SUMMARY OF FGD SYSTEMS BY COMPANY

	TOTAL		STATUS							
			OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED		PLANNED	
COMPANY NAME	NO.	MW	NO.	MW	NO.	MW	NO.	MW	NO.	MW
SOUTHERN ILLINOIS POWER COOP	2	473.	1	173.	0	0.	0	0.	1	300.
SOUTHERN INDIANA GAS & ELEC	1	265.	1	265.	0	0.	0	0.	0	0.
SOUTHWESTERN ELECTRIC POWER	3	2160.	0	0.	0	0.	2	1440.	1	720.
SPRINGFIELD CITY UTILITIES	1	194.	1	194.	0	0.	0	0.	0	0.
SPRINGFIELD WATER, LIGHT & PWR	1	205.	0	0.	1	205.	0	0.	0	0.
ST. JOE ZINC	1	60.	1	60.	0	0.	0	0.	0	0.
SUNFLOWER ELECTRIC COOP	1	347.	0	0.	0	0.	1	347.	0	0.
TAMPA ELECTRIC	1	475.	0	0.	0	0.	1	475.	0	0.
TENNESSEE VALLEY AUTHORITY	7	3153.	3	570.	3	1983.	1	600.	0	0.
TEXAS MUNICIPAL POWER AGENCY	1	400.	0	0.	1	400.	0	0.	0	0.
TEXAS POWER & LIGHT	3	1882.	0	0.	1	382.	2	1500.	0	0.
TEXAS UTILITIES	8	5585.	4	2585.	0	0.	1	750.	3	2250.
TUCSON ELECTRIC POWER	2	740.	0	0.	0	0.	2	740.	0	0.
UNITED POWER ASSOCIATION	1	50.	0	0.	1	50.	0	0.	0	0.
UTAH POWER & LIGHT	6	2216.	3	1086.	1	330.	2	800.	0	0.
WEST PENN POWER	1	300.	0	0.	0	0.	1	300.	0	0.
WEST TEXAS UTILITIES	1	720.	0	0.	0	0.	0	0.	1	720.
TOTALS	208	94737.	76	25832.	39	16442.	30	14164.	63	38299.

NOTE - PLANNED STATUS INCLUDES LETTER OF INTENT SIGNED, REQUESTING/EVALUTING BIDS, AND CONSIDERING ONLY FGD SYSTEMS

SECTION 5
SUMMARY OF FGD SYSTEMS BY SYSTEM SUPPLIER

	TOTAL		STATUS					
			OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED	
SYSTEM SUPPLIER/PROCESS	NO.	MW	NO.	MW	NO.	MW	NO.	MW
AIR CORRECTION DIVISION, UOP								
LIME	2	822.	2	822.	0	0.	0	0.
LIMESTONE	5	2616.	3	1176.	0	0.	2	1440.
LIME/LIMESTONE	1	10.	1	10.	0	0.	0	0.
SODIUM CARBONATE	2	880.	1	550.	1	330.	0	0.
TOTAL -	10	4328.	7	2558.	1	330.	2	1440.
AMERICAN AIR FILTER								
LIME	6	1673.	4	936.	2	737.	0	0.
LIMESTONE	1	280.	0	0.	1	280.	0	0.
TOTAL -	7	1953.	4	936.	3	1017.	0	0.
BABCOCK & WILCOX								
LIME	4	1951.	1	618.	3	1333.	0	0.
LIMESTONE	8	2467.	4	1413.	3	999.	1	55.
LIME/SPRAY DRYING	2	1017.	0	0.	1	570.	1	447.
TOTAL -	14	5435.	5	2031.	7	2902.	2	502.
BUELL DIVISION, ENVIROTECH								
DUAL ALKALI	1	617.	1	617.	0	0.	0	0.
TOTAL -	1	617.	1	617.	0	0.	0	0.
CHEMICO DIVISION, ENVIROTECH								
LIME	8	4138.	7	3838.	0	0.	1	300.
LIMESTONE	8	5000.	1	800.	3	1900.	4	2300.
LIME/ALKALINE FLYASH	3	579.	3	579.	0	0.	0	0.
LIME/LIMESTONE	1	10.	1	10.	0	0.	0	0.
TOTAL -	20	9727.	12	5227.	3	1900.	5	2600.
COMBUSTION ENGINEERING								
LIME	6	1160.	4	452.	2	708.	0	0.
LIMESTONE	9	3575.	4	1575.	3	1357.	2	643.
LIMESTONE/ALKALINE FLYASH	2	1480.	2	1480.	0	0.	0	0.
LIME/ALKALINE FLYASH	2	654.	2	654.	0	0.	0	0.
TOTAL -	19	6869.	12	4161.	5	2065.	2	643.
COMBUSTION EQUIP ASSOCIATES								
DUAL ALKALI	1	299.	1	299.	0	0.	0	0.
LIME	1	500.	0	0.	1	500.	0	0.
LIME/ALKALINE FLYASH	5	2305.	3	905.	2	1400.	0	0.
SODIUM CARBONATE	3	375.	3	375.	0	0.	0	0.
TOTAL -	10	3479.	7	1579.	3	1900.	0	0.
DAVY MCKEE								
WELLMAN LORD	8	2074.	7	1540.	1	534.	0	0.
TOTAL -	8	2074.	7	1540.	1	534.	0	0.
ENVIRONEERING, RILEY STOKER								
LIMESTONE	3	664.	3	664.	0	0.	0	0.
MAGNESIUM OXIDE	1	600.	0	0.	0	0.	1	600.
TOTAL -	4	1264.	3	664.	0	0.	1	600.
FMC								
DUAL ALKALI	3	1107.	1	265.	0	0.	2	842.
TOTAL -	3	1107.	1	265.	0	0.	2	842.
JOY MFG/NIRO ATOMIZER								
LIME/SPRAY DRYING	6	1916.	0	0.	2	550.	4	1366.
TOTAL -	6	1916.	0	0.	2	550.	4	1366.
MITSUBISHI HEAVY INDUSTRIES								
LIMESTONE	2	882.	0	0.	2	882.	0	0.
TOTAL -	2	882.	0	0.	2	882.	0	0.

SECTION 5
SUMMARY OF FGD SYSTEMS BY SYSTEM SUPPLIER

			STATUS					
	TOTAL		OPERATIONAL		CONSTRUCTION		CONTRACT AWARDED	
SYSTEM SUPPLIER/PROCESS	NO.	MW	NO.	MW	NO.	MW	NO.	MW
MORRISON & KNUDSEN/U.S.B.M.								
CITRATE	1	60.	1	60.	0	0.	0	0.
TOTAL -	1	60.	1	60.	0	0.	0	0.
PEABODY PROCESS SYSTEMS								
LIMESTONE	8	3445.	3	758.	1	447.	4	2240.
LIME/ALKALINE FLYASH	1	475.	1	475.	0	0.	0	0.
TOTAL -	9	3920.	4	1233.	1	447.	4	2240.
PULLMAN KELLOG								
LIMESTONE	2	880.	0	0.	0	0.	2	880.
TOTAL -	2	880.	0	0.	0	0.	2	880.
PULLMAN KELLOGG								
LIME	1	917.	1	917.	0	0.	0	0.
LIMESTONE	4	1880.	2	560.	2	1320.	0	0.
TOTAL -	5	2797.	3	1477.	2	1320.	0	0.
RESEARCH-COTTRELL								
LIMESTONE	14	5281.	8	2934.	4	1431.	2	916.
LIME/LIMESTONE	1	475.	0	0.	0	0.	1	475.
LIME/SPRAY DRYING	1	50.	0	0.	1	50.	0	0.
TOTAL -	16	5806.	8	2934.	5	1481.	3	1391.
ROCKWELL INTERNATIONAL								
AQUEOUS CARBONATE/SPRAY DRYING	1	100.	0	0.	1	100.	0	0.
TOTAL -	1	100.	0	0.	1	100.	0	0.
TENNESSEE VALLEY AUTHORITY								
LIMESTONE	1	550.	1	550.	0	0.	0	0.
TOTAL -	1	550.	1	550.	0	0.	0	0.
UNITED ENGINEERS								
LIME	2	1510.	0	0.	0	0.	2	1510.
MAGNESIUM OXIDE	3	724.	0	0.	2	574.	1	150.
TOTAL -	5	2234.	0	0.	2	574.	3	1660.
WHEELABRATOR-FRYE/R.I.								
SODIUM CARBONATE/SPRAY DRYING	1	440.	0	0.	1	440.	0	0.
TOTAL -	1	440.	0	0.	1	440.	0	0.
TOTAL -	145	56438.	76	25832.	39	16442.	30	14164.

SECTION 6
SUMMARY OF FGD SYSTEMS BY PROCESS

PROCESS	TOTAL NO.	TOTAL MW	STATUS: OPERATIONAL NO.	OPERATIONAL MW	CONSTRUCTION NO.	CONSTRUCTION MW	CONTRACT AWARDED NO.	CONTRACT AWARDED MW	PLANNED NO.	PLANNED MW
AQUEOUS CARBONATE/SPRAY DRYING	1	100.	0	0.	1	100.	0	0.	0	0.
CITRATE	1	60.	1	60.	0	0.	0	0.	0	0.
LIMESTONE	3	1766.	0	0.	0	0.	1	166.	2	1600.
LIME/LIMESTONE	1	475.	0	0.	0	0.	1	475.	0	0.
MAGNESIUM OXIDE	4	1324.	0	0.	2	574.	2	750.	0	0.
WELLMAN LORD	8	2074.	7	1540.	1	534.	0	0.	0	0.
SUBTOTAL - SALEABLE PRODUCT	18	5799.	8	1600.	4	1208.	4	1391.	2	1600.
DUAL ALKALI	5	2023.	3	1181.	0	0.	2	842.	0	0.
LIME	34	15951.	19	7583.	8	3278.	3	1810.	4	3280.
LIMESTONE	73	32569.	29	10430.	19	8616.	15	7588.	10	5935.
LIMESTONE/ALKALINE FLYASH	2	1480.	2	1480.	0	0.	0	0.	0	0.
LIME/ALKALINE FLYASH	11	4013.	9	2613.	2	1400.	0	0.	0	0.
LIME/LIMESTONE	2	20.	2	20.	0	0.	0	0.	0	0.
LIME/SPRAY DRYING	10	3027.	0	0.	4	1170.	5	1813.	1	44.
PROCESS NOT SELECTED	12	7020.	0	0.	0	0.	0	0.	12	7020.
SODIUM CARBONATE	9	3155.	4	925.	1	330.	0	0.	4	1900.
SODIUM CARBONATE/SPRAY DRYING	1	440.	0	0.	1	440.	0	0.	0	0.
SUBTOTAL - THROWAWAY PRODUCT	159	69698.	68	24232.	35	15234.	25	12053.	31	18179.
TOTALS	177	75497.	76	25832.	39	16442.	29	13444.	33	19779.
SALEABLE PRODUCT PROCESS % OF TOTAL MW		8		6		7		10		8

NOTE: 31 UNITS ARE UNDECIDED AND ARE NOT INCLUDED IN THIS TABLE

SECTION 7
SUMMARY OF OPERATIONAL FGD SYSTEMS BY PROCESS AND UNIT

PROCESS/ UNIT NAME	UNIT NO.	CAPACITY MW	INITIAL STARTUP	COMMERCIAL STARTUP
CITRATE				
G.F. WEATON	1	60.	11/79	1/80
		60.		
DUAL ALKALI				
A.B. BROWN	1	265.	3/79	4/79
CANE RUN	6	299.	4/79	0/ 0
NEWTON	1	617.	9/79	12/79
		1181.		
LIME				
BRUCE MANSFIELD	1	917.	12/75	6/76
BRUCE MANSFIELD	2	917.	7/77	10/77
BRUCE MANSFIELD	3	917.	6/80	6/80
CANE RUN	4	188.	8/76	8/77
CANE RUN	5	200.	12/77	7/78
CONESVILLE	5	411.	1/77	2/77
CONESVILLE	6	411.	6/78	7/78
ELRAMA	1-4	510.	10/75	10/75
GREEN	1	242.	12/79	12/79
GREEN RIVER	1-3	64.	9/75	6/76
HAWTHORN	3	90.	11/72	0/ 0
HAWTHORN	4	90.	8/72	0/ 0
HUNTER	1	360.	5/79	5/79
HUNTER	2	360.	6/80	6/80
HUNTINGTON	1	366.	5/78	5/78
MILL CREEK	3	442.	8/78	3/79
PADDY'S RUN	6	72.	4/73	0/ 0
PHILLIPS	1-6	408.	7/73	6/74
PLEASANTS	1	618.	3/79	3/79
		7583.		
LIMESTONE				
APACHE	2	98.	8/78	1/79
APACHE	3	98.	6/79	4/79
CHOLLA	1	119.	10/73	12/73
CHOLLA	2	264.	4/78	6/78
CORONADO	1	280.	11/79	12/79
CORONADO	2	280.	7/80	10/80
CRAIG	2	400.	12/79	5/80
DUCK CREEK	1	416.	7/76	8/78
JEFFREY	1	540.	8/78	0/ 0
JEFFREY	2	490.	4/80	1/80
LA CYGNE	1	820.	2/73	6/73
LARAMIE RIVER	1	570.	7/80	7/80
LAWRENCE	4	125.	1/76	0/ 0
LAWRENCE	5	420.	11/71	0/ 0
MARION	4	173.	5/79	6/79
MARTIN LAKE	1	595.	4/77	10/78
MARTIN LAKE	2	595.	5/78	0/ 0
MARTIN LAKE	3	595.	2/79	0/ 0
MONTICELLO	3	800.	5/78	10/78
PETERSBURG	3	532.	12/77	12/77
POWERTON	51	450.	4/80	6/81
R.D. MORROW, SR.	1	124.	8/78	8/78
R.D. MORROW, SR.	2	124.	6/79	6/79
SOUTHWEST	1	194.	4/77	9/77
TOMBIGBEE	2	179.	9/78	9/78
TOMBIGBEE	3	179.	6/79	6/79
WIDOWS CREEK	8	550.	5/77	1/78
WINYAH	2	140.	7/77	0/ 0
WINYAH	3	280.	5/80	6/80
		10430.		

THIS TABLE IDENTIFIES UNITS IN ALPHABETICAL ORDER.
RESPECTIVE COMPANIES CAN BE FOUND IN SECTION 1.

SECTION 7
SUMMARY OF OPERATIONAL FGD SYSTEMS BY PROCESS AND UNIT

PROCESS/ UNIT NAME	UNIT NO.	CAPACITY MW	INITIAL STARTUP	COMMERCIAL STARTUP
LIMESTONE/ALKALINE FLYASH				
SHERBURNE	1	740.	3/76	5/76
SHERBURNE	2	740.	3/77	4/77
		1480.		
LIME/ALKALINE FLYASH				
CLAY BOSWELL	4	475.	4/80	0/ 0
COAL CREEK	1	327.	7/79	8/79
COAL CREEK	2	327.	7/80	9/80
COLSTRIP	1	360.	9/75	11/75
COLSTRIP	2	360.	5/76	10/76
FOUR CORNERS	1	175.	11/79	0/ 0
FOUR CORNERS	2	175.	11/79	0/ 0
FOUR CORNERS	3	229.	11/79	0/ 0
MILTON R. YOUNG	2	185.	9/77	6/78
		2613.		
LIME/LIMESTONE				
SHAWNEE	10A	10.	4/72	0/ 0
SHAWNEE	10B	10.	4/72	0/ 0
		20.		
SODIUM CARBONATE				
JIM BRIDGER	4	550.	9/79	2/80
REID GARDNER	1	125.	3/74	4/74
REID GARDNER	2	125.	4/74	0/ 0
REID GARDNER	3	125.	6/76	7/76
		925.		
WELLMAN LORD				
DEAN H. MITCHELL	11	115.	7/76	6/77
DELAWARE CITY	1	60.	5/80	5/80
DELAWARE CITY	2	60.	5/80	5/80
DELAWARE CITY	3	60.	5/80	5/80
SAN JUAN	1	361.	4/78	4/78
SAN JUAN	2	350.	8/78	8/78
SAN JUAN	3	534.	12/79	0/ 0
		1540.		
TOTAL		25832.		

SECTION 8
SUMMARY OF END-PRODUCT DISPOSAL PRACTICES FOR OPERATIONAL FGD SYSTEMS

PROCESS/ UNIT NAME	UNIT NO	THROWAWAY STABILIZED	THROWAWAY UNSTABILIZED	BYPRODUCT TYPE	BYPRODUCT DISPOSITION
CITRATE					
G.F. WEATON	1			ELEMENTAL SULFUR	
DUAL ALKALI					
A.B. BROWN	1	LANDFILL			
CANE RUN	6	LANDFILL			
NEWTON	1				
LIME					
BRUCE MANSFIELD	1	LANDFILL			
BRUCE MANSFIELD	2	LANDFILL			
BRUCE MANSFIELD	3				
CANE RUN	4	LINED POND			
CANE RUN	5	LINED POND			
CONESVILLE	5	POND			
CONESVILLE	6	POND			
ELRAMA	1-4	LANDFILL			
GREEN	1				
GREEN RIVER	1-3		LINED POND		
HAWTHORN	3	POND			
HAWTHORN	4	POND			
HUNTER	1	POND			
HUNTER	2	POND			
HUNTINGTON	1	LANDFILL			
MILL CREEK	3	POND			
PADDY'S RUN	6	POND			
PHILLIPS	1-6	LANDFILL			
PLEASANTS	1				
LIMESTONE					
APACHE	2		POND		
APACHE	3		POND		
CHOLLA	1		POND		
CHOLLA	2		UNLINED POND		
CORONADO	1		LINED POND		
CORONADO	2		LINED POND		
CRAIG	2		MINEFILL		
DUCK CREEK	1		LINED POND		
JEFFREY	1	POND			
JEFFREY	2	LINED POND			
LA CYGNE	1		UNLINED POND		
LARAMIE RIVER	1	LANDFILL			LANDFILL
LAWRENCE	4	POND			
LAWRENCE	5	POND			
MARION	4	LANDFILL			
MARTIN LAKE	1	LANDFILL			
MARTIN LAKE	2	LANDFILL			
MARTIN LAKE	3	LANDFILL			
MONTICELLO	3	LANDFILL			
PETERSBURG	3	LANDFILL			
POWERTON	51	LANDFILL			
R.D. MORROW, SR.	1	LANDFILL			
R.D. MORROW, SR.	2	LANDFILL			
SOUTHWEST	1	LANDFILL			
TOMBIGBEE	2	LINED POND			
TOMBIGBEE	3	LINED POND			
WIDOWS CREEK	8		POND		
WINYAH	2		POND		
WINYAH	3				
LIMESTONE/ALKALINE FLYASH					
SHERBURNE	1	LINED POND			
SHERBURNE	2	LINED POND			

EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

SECTION 8

SUMMARY OF END-PRODUCT DISPOSAL PRACTICES FOR OPERATIONAL FGD SYSTEMS

PROCESS/ UNIT NAME	UNIT NO	THROWAWAY		BYPRODUCT	
		STABILIZED	UNSTABILIZED	TYPE	DISPOSITION
LIME/ALKALINE FLYASH					
CLAY BOSWELL	4		LINED POND		
COAL CREEK	1	LINED POND			
COAL CREEK	2	LINED POND			
COLSTRIP	1		POND		
COLSTRIP	2		POND		
FOUR CORNERS	1				
FOUR CORNERS	2				
FOUR CORNERS	3				
MILTON R. YOUNG	2		MINEFILL		
LIME/LIMESTONE					
SHAWNEE	10A				
SHAWNEE	10B				
SODIUM CARBONATE					
JIM BRIDGER	4		LINED POND		
REID GARDNER	1		LINED POND		
REID GARDNER	2		LINED POND		
REID GARDNER	3		LINED POND		
WELLMAN LORD					
DEAN H. MITCHELL	11			ELEMENTAL SULFUR	
DELAWARE CITY	1	LINED POND		SULFURIC ACID	MARKETED
DELAWARE CITY	2	LINED POND		SULFURIC ACID	MARKETED
DELAWARE CITY	3	LINED POND		SULFURIC ACID	MARKETED
SAN JUAN	1			ELEMENTAL SULFUR	MARKETED
SAN JUAN	2			ELEMENTAL SULFUR	MARKETED
SAN JUAN	3			SULFURIC ACID	MARKETED

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ALABAMA ELECTRIC COOP TOMBIGBEE	2	NEW	179.0	LIMESTONE PEABODY PROCESS SYSTEMS	9/78
ALABAMA ELECTRIC COOP TOMBIGBEE	3	NEW	179.0	LIMESTONE PEABODY PROCESS SYSTEMS	6/79
ARIZONA ELECTRIC POWER COOP APACHE	2	NEW	98.0	LIMESTONE RESEARCH-COTTRELL	8/78
ARIZONA ELECTRIC POWER COOP APACHE	3	NEW	98.0	LIMESTONE RESEARCH-COTTRELL	6/79
ARIZONA PUBLIC SERVICE CHOLLA	1	RETROFIT	119.0	LIMESTONE RESEARCH-COTTRELL	10/73
ARIZONA PUBLIC SERVICE CHOLLA	2	NEW	264.0	LIMESTONE RESEARCH-COTTRELL	4/78
ARIZONA PUBLIC SERVICE FOUR CORNERS	1	RETROFIT	175.0	LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH	11/79
ARIZONA PUBLIC SERVICE FOUR CORNERS	2	RETROFIT	175.0	LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH	11/79
ARIZONA PUBLIC SERVICE FOUR CORNERS	3	RETROFIT	229.0	LIME/ALKALINE FLYASH CHEMICO DIVISION, ENVIROTECH	11/79
BASIN ELECTRIC POWER COOP LARAMIE RIVER	1	NEW	570.0	LIMESTONE RESEARCH-COTTRELL	7/80
BIG RIVERS ELECTRIC GREEN	1	NEW	242.0	LIME AMERICAN AIR FILTER	12/79
CENTRAL ILLINOIS LIGHT DUCK CREEK	1	NEW	416.0	LIMESTONE ENVIRONEERING, RILEY STOKER	7/76
CENTRAL ILLINOIS PUBLIC SERV NEWTON	1	NEW	617.0	DUAL ALKALI BUELL DIVISION, ENVIROTECH	9/79
COLORADO UTE ELECTRIC ASSN CRAIG	2	NEW	400.0	LIMESTONE PEABODY PROCESS SYSTEMS	12/79
COLUMBUS & SOUTHERN OHIO ELEC CONESVILLE	5	NEW	411.0	LIME AIR CORRECTION DIVISION, UOP	1/77
COLUMBUS & SOUTHERN OHIO ELEC CONESVILLE	6	NEW	411.0	LIME AIR CORRECTION DIVISION, UOP	6/78
COMMONWEALTH EDISON POWERTON	51	RETROFIT	450.0	LIMESTONE AIR CORRECTION DIVISION, UOP	4/80
COOPERATIVE POWER ASSOCIATION COAL CREEK	1	NEW	327.0	LIME/ALKALINE FLYASH COMBUSTION ENGINEERING	7/79
COOPERATIVE POWER ASSOCIATION COAL CREEK	2	NEW	327.0	LIME/ALKALINE FLYASH COMBUSTION ENGINEERING	7/80
DELMARVA POWER & LIGHT DELAWARE CITY	1	RETROFIT	60.0	WELLMAN LORD DAVY MCKEE	5/80
DELMARVA POWER & LIGHT DELAWARE CITY	2	RETROFIT	60.0	WELLMAN LORD DAVY MCKEE	5/80
DELMARVA POWER & LIGHT DELAWARE CITY	3	RETROFIT	60.0	WELLMAN LORD DAVY MCKEE	5/80
DUQUESNE LIGHT ELRAMA	1-4	RETROFIT	510.0	LIME CHEMICO DIVISION, ENVIROTECH	10/75
DUQUESNE LIGHT PHILLIPS	1-6	RETROFIT	408.0	LIME CHEMICO DIVISION, ENVIROTECH	7/73

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
INDIANAPOLIS POWER & LIGHT PETERSBURG	3	NEW	532.0	LIMESTONE AIR CORRECTION DIVISION, UOP	12/77
KANSAS CITY POWER & LIGHT HAWTHORN	3	RETROFIT	90.0	LIME COMBUSTION ENGINEERING	11/72
KANSAS CITY POWER & LIGHT HAWTHORN	4	RETROFIT	90.0	LIME COMBUSTION ENGINEERING	8/72
KANSAS CITY POWER & LIGHT LA CYGNE	1	NEW	820.0	LIMESTONE BABCOCK & WILCOX	2/73
KANSAS POWER & LIGHT JEFFREY	1	NEW	540.0	LIMESTONE COMBUSTION ENGINEERING	8/78
KANSAS POWER & LIGHT JEFFREY	2	NEW	490.0	LIMESTONE COMBUSTION ENGINEERING	4/80
KANSAS POWER & LIGHT LAWRENCE	4	RETROFIT	125.0	LIMESTONE COMBUSTION ENGINEERING	1/76
KANSAS POWER & LIGHT LAWRENCE	5	RETROFIT	420.0	LIMESTONE COMBUSTION ENGINEERING	11/71
KENTUCKY UTILITIES GREEN RIVER	1-3	RETROFIT	64.0	LIME AMERICAN AIR FILTER	9/75
LOUISVILLE GAS & ELECTRIC CANE RUN	4	RETROFIT	188.0	LIME AMERICAN AIR FILTER	8/76
LOUISVILLE GAS & ELECTRIC CANE RUN	5	RETROFIT	200.0	LIME COMBUSTION ENGINEERING	12/77
LOUISVILLE GAS & ELECTRIC CANE RUN	6	RETROFIT	299.0	DUAL ALKALI COMBUSTION EQUIP ASSOCIATES	4/79
LOUISVILLE GAS & ELECTRIC MILL CREEK	3	NEW	442.0	LIME AMERICAN AIR FILTER	8/78
LOUISVILLE GAS & ELECTRIC PADDY'S RUN	6	RETROFIT	72.0	LIME COMBUSTION ENGINEERING	4/73
MINNESOTA POWER & LIGHT CLAY BOSWELL	4	NEW	475.0	LIME/ALKALINE FLYASH PEABODY PROCESS SYSTEMS	4/80
MINNKOTA POWER COOPERATIVE MILTON R. YOUNG	2	NEW	185.0	LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES	9/77
MONONGAHELA POWER PLEASANTS	1	NEW	618.0	LIME BABCOCK & WILCOX	3/79
MONTANA POWER COLSTRIP	1	NEW	360.0	LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES	9/75
MONTANA POWER COLSTRIP	2	NEW	360.0	LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES	5/76
NEVADA POWER REID GARDNER	1	RETROFIT	125.0	SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES	3/74
NEVADA POWER REID GARDNER	2	RETROFIT	125.0	SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES	4/74
NEVADA POWER REID GARDNER	3	NEW	125.0	SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES	6/76
NORTHERN INDIANA PUB SERVICE DEAN H. MITCHELL	11	RETROFIT	115.0	WELLMAN LORD DAVY MCKEE	7/76
NORTHERN STATES POWER SHERBURNE	1	NEW	740.0	LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING	3/76

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
NORTHERN STATES POWER SHERBURNE	2	NEW	740.0	LIMESTONE/ALKALINE FLYASH COMBUSTION ENGINEERING	3/77
PACIFIC POWER & LIGHT JIM BRIDGER	4	NEW	550.0	SODIUM CARBONATE AIR CORRECTION DIVISION, UOP	9/79
PENNSYLVANIA POWER BRUCE MANSFIELD	1	NEW	917.0	LIME CHEMICO DIVISION, ENVIROTECH	12/75
PENNSYLVANIA POWER BRUCE MANSFIELD	2	NEW	917.0	LIME CHEMICO DIVISION, ENVIROTECH	7/77
PENNSYLVANIA POWER BRUCE MANSFIELD	3	NEW	917.0	LIME PULLMAN KELLOGG	6/80
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	1	RETROFIT	361.0	WELLMAN LORD DAVY MCKEE	4/78
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	2	RETROFIT	350.0	WELLMAN LORD DAVY MCKEE	8/78
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	3	NEW	534.0	WELLMAN LORD DAVY MCKEE	12/79
SALT RIVER PROJECT CORONADO	1	NEW	280.0	LIMESTONE PULLMAN KELLOGG	11/79
SALT RIVER PROJECT CORONADO	2	NEW	280.0	LIMESTONE PULLMAN KELLOGG	7/80
SOUTH CAROLINA PUBLIC SERVICE WINYAH	2	NEW	140.0	LIMESTONE BABCOCK & WILCOX	7/77
SOUTH CAROLINA PUBLIC SERVICE WINYAH	3	NEW	280.0	LIMESTONE BABCOCK & WILCOX	5/80
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW, SR.	1	NEW	124.0	LIMESTONE ENVIRONEERING, RILEY STOKER	8/78
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW, SR.	2	NEW	124.0	LIMESTONE ENVIRONEERING, RILEY STOKER	6/79
SOUTHERN ILLINOIS POWER COOP MARION	4	NEW	173.0	LIMESTONE BABCOCK & WILCOX	5/79
SOUTHERN INDIANA GAS & ELEC A.B. BROWN	1	NEW	265.0	DUAL ALKALI FMC	3/79
SPRINGFIELD CITY UTILITIES SOUTHWEST	1	NEW	194.0	LIMESTONE AIR CORRECTION DIVISION, UOP	4/77
ST. JOE ZINC G.F. WEATON	1	RETROFIT	60.0	CITRATE MORRISON & KNUDSEN/U.S.B.M.	11/79
TENNESSEE VALLEY AUTHORITY SHAWNEE	10A	RETROFIT	10.0	LIME/LIMESTONE AIR CORRECTION DIVISION, UOP	4/72
TENNESSEE VALLEY AUTHORITY SHAWNEE	10B	RETROFIT	10.0	LIME/LIMESTONE CHEMICO DIVISION, ENVIROTECH	4/72
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK	8	RETROFIT	550.0	LIMESTONE TENNESSEE VALLEY AUTHORITY	5/77
TEXAS UTILITIES MARTIN LAKE	1	NEW	595.0	LIMESTONE RESEARCH-COTTRELL	4/77
TEXAS UTILITIES MARTIN LAKE	2	NEW	595.0	LIMESTONE RESEARCH-COTTRELL	5/78
TEXAS UTILITIES MARTIN LAKE	3	NEW	595.0	LIMESTONE RESEARCH-COTTRELL	2/79

SECTION 9
SUMMARY OF FGD SYSTEMS IN OPERATION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
TEXAS UTILITIES MONTICELLO	3	NEW	800.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	5/78
UTAH POWER & LIGHT HUNTER	1	NEW	360.0	LIME CHEMICO DIVISION, ENVIROTECH	5/79
UTAH POWER & LIGHT HUNTER	2	NEW	360.0	LIME CHEMICO DIVISION, ENVIROTECH	6/80
UTAH POWER & LIGHT HUNTINGTON	1	NEW	366.0	LIME CHEMICO DIVISION, ENVIROTECH	5/78
TOTAL			25832.0		

SECTION 10
SUMMARY OF FGD SYSTEMS UNDER CONSTRUCTION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ARIZONA PUBLIC SERVICE CHOLLA	4	NEW	126.0	LIMESTONE RESEARCH-COTTRELL	6/81
ASSOCIATED ELECTRIC COOP THOMAS HILL	3	NEW	670.0	LIMESTONE PULLMAN KELLOGG	1/82
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY	1	NEW	440.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	4/83
BASIN ELECTRIC POWER COOP LARAMIE RIVER	2	NEW	570.0	LIMESTONE RESEARCH-COTTRELL	6/81
BASIN ELECTRIC POWER COOP LARAMIE RIVER	3	NEW	570.0	LIME/SPRAY DRYING BABCOCK & WILCOX	4/82
BIG RIVERS ELECTRIC GREEN	2	NEW	242.0	LIME AMERICAN AIR FILTER	11/80
CINCINNATI GAS & ELECTRIC EAST BEND	2	NEW	650.0	LIME BABCOCK & WILCOX	12/80
COLORADO UTE ELECTRIC ASSN CRAIG	1	NEW	447.0	LIMESTONE PEABODY PROCESS SYSTEMS	10/80
EAST KENTUCKY POWER COOP SPURLOCK	2	NEW	500.0	LIME COMBUSTION EQUIP ASSOCIATES	1/81
GRAND HAVEN BRD OF LIGHT & PWR J.B. SIMS	3	NEW	65.0	LIME BABCOCK & WILCOX	6/83
HOOSIER ENERGY MEROM	1	NEW	441.0	LIMESTONE MITSUBISHI HEAVY INDUSTRIES	5/82
HOOSIER ENERGY MEROM	2	NEW	441.0	LIMESTONE MITSUBISHI HEAVY INDUSTRIES	9/81
HOUSTON LIGHTING & POWER W.A. PARISH	8	NEW	492.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	11/82
INDIANAPOLIS POWER & LIGHT PETERSBURG	4	NEW	530.0	LIMESTONE RESEARCH-COTTRELL	10/84
LAKELAND UTILITIES MCINTOSH	3	NEW	364.0	LIMESTONE BABCOCK & WILCOX	8/81
LOUISVILLE GAS & ELECTRIC MILL CREEK	1	RETROFIT	358.0	LIME COMBUSTION ENGINEERING	1/81
LOUISVILLE GAS & ELECTRIC MILL CREEK	2	RETROFIT	350.0	LIME COMBUSTION ENGINEERING	12/81
LOUISVILLE GAS & ELECTRIC MILL CREEK	4	NEW	495.0	LIME AMERICAN AIR FILTER	6/82
MONONGAHELA POWER PLEASANTS	2	NEW	618.0	LIME BABCOCK & WILCOX	10/80
MONTANA POWER COLSTRIP	3	NEW	700.0	LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES	5/83
MONTANA POWER COLSTRIP	4	NEW	700.0	LIME/ALKALINE FLYASH COMBUSTION EQUIP ASSOCIATES	3/84
MONTANA-DAKOTA UTILITIES COYOTE	1	NEW	440.0	SODIUM CARBONATE/SPRAY DRYING WHEELABRATOR-FRYE/R.I.	3/81
NIAGARA MOHAWK POWER COOP CHARLES R. HUNTLEY	66	RETROFIT	100.0	AQUEOUS CARBONATE/SPRAY DRYING ROCKWELL INTERNATIONAL	4/82
NORTHERN STATES POWER RIVERSIDE	6,7	RETROFIT	110.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	11/80

SECTION 10
SUMMARY OF FGD SYSTEMS UNDER CONSTRUCTION

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
PHILADELPHIA ELECTRIC EDDYSTONE	1	RETROFIT	240.0	MAGNESIUM OXIDE UNITED ENGINEERS	12/82
PHILADELPHIA ELECTRIC EDDYSTONE	2	RETROFIT	334.0	MAGNESIUM OXIDE UNITED ENGINEERS	12/82
PUBLIC SERVICE INDIANA GIBSON	5	NEW	650.0	LIMESTONE PULLMAN KELLOGG	0/82
PUBLIC SERVICE OF NEW MEXICO SAN JUAN	4	NEW	534.0	WELLMAN LORD DAVY MCKEE	6/82
SAN MIGUEL ELECTRIC COOP SAN MIGUEL	1	NEW	400.0	LIMESTONE BABCOCK & WILCOX	11/80
SIKESTON BRD OF MUNICIPAL UTIL SIKESTON	1	NEW	235.0	LIMESTONE BABCOCK & WILCOX	3/81
SOUTH CAROLINA PUBLIC SERVICE WINYAH	4	NEW	280.0	LIMESTONE AMERICAN AIR FILTER	7/81
SPRINGFIELD WATER, LIGHT & PWR DALLMAN	3	NEW	205.0	LIMESTONE RESEARCH-COTTRELL	10/80
TENNESSEE VALLEY AUTHORITY PARADISE	1	RETROFIT	704.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	3/82
TENNESSEE VALLEY AUTHORITY PARADISE	2	RETROFIT	704.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	6/82
TENNESSEE VALLEY AUTHORITY WIDOWS CREEK	7	RETROFIT	575.0	LIMESTONE COMBUSTION ENGINEERING	9/81
TEXAS MUNICIPAL POWER AGENCY GIBBONS CREEK	1	NEW	400.0	LIMESTONE COMBUSTION ENGINEERING	1/82
TEXAS POWER & LIGHT SANDOW	4	NEW	382.0	LIMESTONE COMBUSTION ENGINEERING	11/80
UNITED POWER ASSOCIATION STANTON	1A	NEW	50.0	LIME/SPRAY DRYING RESEARCH-COTTRELL	6/82
UTAH POWER & LIGHT NAUGHTON	3	RETROFIT	330.0	SODIUM CARBONATE AIR CORRECTION DIVISION, UOP	6/81
TOTAL			16442.0		

SECTION 11

SUMMARY OF CONTRACT AWARDED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ARIZONA PUBLIC SERVICE FOUR CORNERS	4	RETROFIT	755.0	LIME UNITED ENGINEERS	0/82
ARIZONA PUBLIC SERVICE FOUR CORNERS	5	RETROFIT	755.0	LIME UNITED ENGINEERS	0/82
BIG RIVERS ELECTRIC D.B. WILSON	1	NEW	440.0	LIMESTONE PULLMAN KELLOG	7/84
BIG RIVERS ELECTRIC D.B. WILSON	2	NEW	440.0	LIMESTONE PULLMAN KELLOG	1/86
COLORADO UTE ELECTRIC ASSN CRAIG	3	NEW	447.0	LIME/SPRAY DRYING BABCOCK & WILCOX	0/82
DESERET GEN & TRANS COOP MOON LAKE	1	NEW	410.0	LIMESTONE COMBUSTION ENGINEERING	9/84
MICHIGAN SO CENTRAL PWR AGENCY PROJECT	1	NEW	55.0	LIMESTONE BABCOCK & WILCOX	6/82
MUSCATINE POWER & WATER MUSCATINE	9	NEW	166.0	LIMESTONE RESEARCH-COTTRELL	9/82
NORTHERN INDIANA PUB SERVICE SCHAHFER	17	NEW	421.0	DUAL ALKALI FMC	6/83
NORTHERN INDIANA PUB SERVICE SCHAHFER	18	NEW	421.0	DUAL ALKALI FMC	6/85
PHILADELPHIA ELECTRIC CROMBY	1	RETROFIT	150.0	MAGNESIUM OXIDE UNITED ENGINEERS	5/83
PLAINS ELECTRIC G & T COOP PLAINS ESCALANTE	1	NEW	233.0	LIMESTONE COMBUSTION ENGINEERING	12/83
PLATTE RIVER POWER AUTHORITY RAWHIDE	1	NEW	279.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	12/83
SEMINOLE ELECTRIC SEMINOLE	1	NEW	620.0	LIMESTONE PEABODY PROCESS SYSTEMS	3/83
SEMINOLE ELECTRIC SEMINOLE	2	NEW	620.0	LIMESTONE PEABODY PROCESS SYSTEMS	3/85
SOUTH CAROLINA PUBLIC SERVICE CROSS	1	NEW	500.0	LIMESTONE PEABODY PROCESS SYSTEMS	3/85
SOUTH CAROLINA PUBLIC SERVICE CROSS	2	NEW	500.0	LIMESTONE PEABODY PROCESS SYSTEMS	11/83
SOUTHWESTERN ELECTRIC POWER DOLET HILLS	1	NEW	720.0	LIMESTONE AIR CORRECTION DIVISION, UOP	0/86
SOUTHWESTERN ELECTRIC POWER HENRY W. PIRKEY	1	NEW	720.0	LIMESTONE AIR CORRECTION DIVISION, UOP	12/84
SUNFLOWER ELECTRIC COOP HOLCOMB	1	NEW	347.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	9/83
TAMPA ELECTRIC BIG BEND	4	NEW	475.0	LIME/LIMESTONE RESEARCH-COTTRELL	12/84
TENNESSEE VALLEY AUTHORITY JOHNSONVILLE	1-10	RETROFIT	600.0	MAGNESIUM OXIDE ENVIRONEERING, RILEY STOKER	12/81
TEXAS POWER & LIGHT TWIN OAKS	1	NEW	750.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	8/84
TEXAS POWER & LIGHT TWIN OAKS	2	NEW	750.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	8/85

SECTION 11
SUMMARY OF CONTRACT AWARDED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
TEXAS UTILITIES MARTIN LAKE	4	NEW	750.0	LIMESTONE RESEARCH-COTTRELL	0/85
TUCSON ELECTRIC POWER SPRINGERVILLE	1	NEW	370.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	1/85
TUCSON ELECTRIC POWER SPRINGERVILLE	2	NEW	370.0	LIME/SPRAY DRYING JOY MFG/NIRO ATOMIZER	3/87
UTAH POWER & LIGHT HUNTER	3	NEW	400.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	6/83
UTAH POWER & LIGHT HUNTER	4	NEW	400.0	LIMESTONE CHEMICO DIVISION, ENVIROTECH	6/85
WEST PENN POWER MITCHELL	33	RETROFIT	300.0	LIME CHEMICO DIVISION, ENVIROTECH	8/82
TOTAL			14164.0		

SECTION 12
SUMMARY OF PLANNED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
LETTER OF INTENT SIGNED					
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE	5	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/90
MIDDLE SOUTH UTILITIES ARKANSAS LIGNITE	6	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/92
MIDDLE SOUTH UTILITIES UNASSIGNED	1	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/89
MIDDLE SOUTH UTILITIES UNASSIGNED	2	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/93
MIDDLE SOUTH UTILITIES WILTON	1	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/88
MIDDLE SOUTH UTILITIES WILTON	2	NEW	890.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/91
NEVADA POWER REID GARDNER	4	NEW	250.0	SODIUM CARBONATE COMBUSTION EQUIP ASSOCIATES	4/83
TOTAL			890.0		
REQUESTING/EVALUATING BIDS					
BASIN ELECTRIC POWER COOP ANTELOPE VALLEY	2	NEW	440.0	LIME/SPRAY DRYING VENDOR NOT SELECTED	10/85
CENTRAL ILLINOIS LIGHT DUCK CREEK	2	NEW	450.0	LIMESTONE VENDOR NOT SELECTED	1/86
DESERET GEN & TRANS COOP MOON LAKE	2	NEW	410.0	LIMESTONE VENDOR NOT SELECTED	0/88
GENERAL PUBLIC UTILITIES COHO	1	NEW	690.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/91
GENERAL PUBLIC UTILITIES SEWARD	7	NEW	690.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/87
HOUSTON LIGHTING & POWER LIMESTONE	1	NEW	750.0	LIMESTONE VENDOR NOT SELECTED	12/84
HOUSTON LIGHTING & POWER LIMESTONE	2	NEW	750.0	LIMESTONE VENDOR NOT SELECTED	12/85
IOWA ELECTRIC LIGHT & PWR GUTHRIE CO.	1	NEW	720.0	LIMESTONE VENDOR NOT SELECTED	11/84
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY	1	NEW	575.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	7/85
LOUISVILLE GAS & ELECTRIC TRIMBLE COUNTY	2	NEW	575.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	7/88
MARQUETTE BOARD OF LIGHT & PWR SHIRAS	3	NEW	44.0	LIME/SPRAY DRYING VENDOR NOT SELECTED	10/82
NEVADA POWER WARNER VALLEY	1	NEW	295.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/85
NEVADA POWER WARNER VALLEY	2	NEW	295.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/86
NEW YORK STATE ELEC & GAS SOMERSET	1	NEW	625.0	LIMESTONE VENDOR NOT SELECTED	6/84
PACIFIC POWER & LIGHT JIM BRIDGER	1	RETROFIT	550.0	SODIUM CARBONATE VENDOR NOT SELECTED	0/88

SECTION 12
SUMMARY OF PLANNED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
PACIFIC POWER & LIGHT JIM BRIDGER	2	RETROFIT	550.0	SODIUM CARBONATE VENDOR NOT SELECTED	0/84
PACIFIC POWER & LIGHT JIM BRIDGER	3	RETROFIT	550.0	SODIUM CARBONATE VENDOR NOT SELECTED	0/86
TEXAS UTILITIES FOREST GROVE	1	NEW	750.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/87
TOTAL			440.0		

CONSIDERING FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
ATLANTIC CITY ELECTRIC CUMBERLAND	1	NEW	330.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/88
CAJUN ELECTRIC POWER COOP BIG CAJUN III	1	NEW	540.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/85
CENTRAL MAINE POWER SEARS ISLAND	1	NEW	600.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/89
CENTRAL POWER & LIGHT COLETO CREEK	2	NEW	720.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	9/86
CINCINNATI GAS & ELECTRIC EAST BEND	1	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	10/87
COLUMBUS & SOUTHERN OHIO ELEC POSTON	5	NEW	375.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	8/86
COLUMBUS & SOUTHERN OHIO ELEC POSTON	6	NEW	375.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/89
DELMARVA POWER & LIGHT VIENNA	9	NEW	550.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/87
EAST KENTUCKY POWER COOP J.K. SMITH	1	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/85
EAST KENTUCKY POWER COOP J.K. SMITH	2	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/87
GENERAL PUBLIC UTILITIES COAL	1	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	12/92
GENERAL PUBLIC UTILITIES COAL	2	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/94
GENERAL PUBLIC UTILITIES COAL	3	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	12/95
GENERAL PUBLIC UTILITIES COAL	4	NEW	625.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	5/97
INDIANAPOLIS POWER & LIGHT PATRIOT	1	NEW	650.0	LIMESTONE VENDOR NOT SELECTED	0/87
INDIANAPOLIS POWER & LIGHT PATRIOT	2	NEW	650.0	LIMESTONE VENDOR NOT SELECTED	0/ 0
INDIANAPOLIS POWER & LIGHT PATRIOT	3	NEW	650.0	LIMESTONE VENDOR NOT SELECTED	0/ 0
JACKSONVILLE ELEC AUTHORITY NEW PROJECT	1	NEW	600.0	LIMESTONE VENDOR NOT SELECTED	12/85
JACKSONVILLE ELEC AUTHORITY NEW PROJECT	2	NEW	600.0	LIMESTONE VENDOR NOT SELECTED	6/87
LANSING BOARD OF WATER & LIGHT ERICKSON	2	NEW	160.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	1/87

SECTION 12
SUMMARY OF PLANNED FGD SYSTEMS

COMPANY NAME/ UNIT NAME	UNIT NO.	NEW OR RETROFIT	CAPACITY MW	PROCESS/ SYSTEM SUPPLIER	START-UP DATE
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	1	NEW	820.0	LIME VENDOR NOT SELECTED	0/86
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	2	NEW	820.0	LIME VENDOR NOT SELECTED	0/87
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	3	NEW	820.0	LIME VENDOR NOT SELECTED	0/88
LOS ANGELES DEPT OF WTR & PWR INTERMOUNTAIN	4	NEW	820.0	LIME VENDOR NOT SELECTED	0/89
NEBRASKA PUBLIC POWER DISTRICT FOSSIL III	1	NEW	650.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	3/87
NEVADA POWER HARRY ALLEN	1	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/86
NEVADA POWER HARRY ALLEN	2	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/87
NEVADA POWER HARRY ALLEN	3	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/88
NEVADA POWER HARRY ALLEN	4	NEW	500.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	6/89
PACIFIC GAS & ELECTRIC MONTEZUMA	1	NEW	800.0	LIMESTONE VENDOR NOT SELECTED	6/89
PACIFIC GAS & ELECTRIC MONTEZUMA	2	NEW	800.0	LIMESTONE VENDOR NOT SELECTED	6/90
PWR AUTHORITY OF STATE OF NY FOSSIL		NEW	700.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	4/87
SALT RIVER PROJECT CORONADO	3	NEW	280.0	LIMESTONE VENDOR NOT SELECTED	0/89
SOUTHERN ILLINOIS POWER COOP MARION	5	NEW	300.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/88
SOUTHWESTERN ELECTRIC POWER DOLET HILLS	2	NEW	720.0	LIMESTONE VENDOR NOT SELECTED	0/88
TEXAS UTILITIES MILL CREEK	1	NEW	750.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/85
TEXAS UTILITIES MILL CREEK	2	NEW	750.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	0/86
WEST TEXAS UTILITIES OKLAUNION	1	NEW	720.0	PROCESS NOT SELECTED VENDOR NOT SELECTED	12/86
TOTAL			330.0		

SECTION 13

TOTAL FGD UNITS AND CAPACITY (MW) INSTALLED BY YEAR

YEAR	NEW ON LINE NO.	NEW ON LINE MW	TERMINATED NO.	TERMINATED MW	TOTAL ON LINE NO.	TOTAL ON LINE MW
1968	1	140.	0	0.	1	140.
1969	0	0.	1	140.	0	0.
1971	1	420.	0	0.	1	420.
1972	6	485.	0	0.	7	905.
1973	4	1419.	1	175.	10	2149.
1974	2	250.	3	340.	9	2059.
1975	6	2018.	3	1637.	12	2440.
1976	8	2824.	3	850.	17	4414.
1977	10	4464.	1	47.	26	8831.
1978	13	4553.	0	0.	39	13384.
1979	20	6300.	2	143.	57	19541.
1980	20	7383.	0	0.	77	26924.
1981	13	5169.	0	0.	90	32093.
1982	22	9523.	0	0.	112	41616.
1983	12	4405.	0	0.	124	46021.
1984	12	6946.	0	0.	136	52967.
1985	15	8411.	0	0.	151	61378.
1986	11	6340.	0	0.	162	67718.
1987	14	8540.	0	0.	176	76258.
1988	9	5095.	0	0.	185	81353.
1989	8	5065.	0	0.	193	86418.
1990	2	1690.	0	0.	195	88108.
1991	2	1580.	0	0.	197	89688.
1992	2	1515.	0	0.	199	91203.
1993	1	890.	0	0.	200	92093.
1994	1	625.	0	0.	201	92718.
1995	1	625.	0	0.	202	93343.
1997	1	625.	0	0.	203	93968.
UNDEFINED	9	*3262.				

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	COMMONWEALTH EDISON	
PLANT NAME	WILL COUNTY	
UNIT NUMBER	1	
CITY	ROMEOVILLE	
STATE	ILLINOIS	
GROSS UNIT GENERATING CAPACITY - MW	167.0	
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	137.0	
EQUIVALENT SCRUBBED CAPACITY - MW	*******	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	22260.	(9570 BTU/LB)
AVERAGE ASH CONTENT - %	7.40	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	1.50	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PH CONTROL ADDITIVE	LIMESTONE	
SYSTEM SUPPLIER	BABCOCK & WILCOX	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	4/72	
COMMERCIAL START-UP DATE	2/73	
TYPICAL SO2 REMOVAL - %	76.00	
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.00	
** ESP		
NUMBER	1	
TYPE	COLD SIDE	
** PARTICLE SCRUBBER		
NUMBER	2	
TYPE	VENTURI	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
12/79	A	77.0	99.5		57.5						
	B	84.9	100.0		57.8						
	SYSTEM	77.0	99.5		57.5			744	431	428	

** PROBLEMS/SOLUTIONS/COMMENTS

ON DECEMBER 4, UNIT 1 CAME OFF LINE SO THAT THE AIR HEATER HOPPERS AND PRECIPITATOR HOPPERS COULD BE EMPTIED OF CARBON CARRY-OVER AND DEBRIS. DURING THIS OUTAGE THE SHOP REPAIRED A LEAK IN THE POND RETURN LINE.

ON DECEMBER 10, THE A-MODULE DEVELOPED A SERIOUS STEAM LEAK (25,000 MAKE-UP) IN A LOWER REHEAT BUNDLE. THE LEAKING BUNDLE HAD TO BE REMOVED AND REPLACED. THIS RESULTED IN A TWO DAY FORCED OUTAGE. LATER IN THE MONTH THE A-MODULE BLEW ANOTHER REHEATER TUBE FORCING THE BOILER OFF FOR AN ADDITIONAL 25 HOURS AND 12 MINUTES.

THE A-MODULE WAS REMOVED FROM THE GAS PATH ON DECEMBER 29, FOR THREE HOURS TO ALLOW THE MAINTENANCE SHOP TO WELD A LEAKING REHEATER FLANGE.

THE SO2 PLANT FORCED THE BOILER OFF TWICE THIS MONTH. TOTAL FORCED OUTAGE TIME ATTRIBUTED TO THE SCRUBBER WAS 54 HOURS AND 39 MINUTES.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	A	91.0	87.5		63.0						
	B	88.6	84.1		60.6						
	SYSTEM	88.6	84.1		60.6			744	536	451	

** PROBLEMS/SOLUTIONS/COMMENTS

THE FIRST SIX DAYS OF JANUARY, UNIT 1 BOILER WAS OFF THE SYSTEM BECAUSE OF A SLAG SCREEN TUBE LEAK. THE UNIT RETURNED TO SERVICE ON JANUARY 7.

ON JANUARY 16, THE UTILITY HAD TO DERATE UNIT 1 TO 50 MW BECAUSE THE RE-

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

HEATER SECTIONS ON A AND B MODULES WERE PLUGGING. ON JANUARY 17, THE MODULES WERE TAKEN OUT OF THE GAS PATH TO BEGIN REMOVING AND CLEANING THE REHEATER SECTIONS WITH A HIGH PRESSURE (4000 PSI) WATER SPRAY. UNIT 1 BOILER WAS LEFT ON TO PROVIDE STABILITY FOR THE 138 KV SYSTEM.

IN THE PAST, ALL 42 BUNDLES CONSISTING OF SEVEN TUBES PER BUNDLE, HAD TO BE TAKEN OUTSIDE TO BE CLEANED ON A CONCRETE SLAB. IN THIS CASE SINCE TIME WAS THE MOST IMPORTANT FACTOR, A DIFFERENT APPROACH WAS USED. ONLY THE MIDDLE SIX BUNDLES ON EACH MODULE WERE REMOVED. THIS PROVIDED A LARGE ENOUGH SPACE SO THAT A LANCE WITH AN EXTENSION ON IT COULD BE USED TO CLEAN THE BOTTOM OF THE TWO TOP BUNDLES AND THE TOP OF THE TWO BOTTOM BUNDLES. THERE ARE DOORS THAT ALLOW EASY ACCESS TO THE TOP AND BOTTOM OF THE REHEATER. USING THIS METHOD, ONLY 12 OR THE 42 BUNDLES WERE REMOVED. IN THE PAST, THIS JOB HAS TAKEN AS LONG AS TWO WEEKS TO COMPLETE. USING THE NEW METHOD, ALL THE REHEATER BUNDLES WERE CLEANED IN 20 HOURS.

THE B-MODULE WAS FORCED OFF LINE ON TWO OTHER OCCASIONS IN JANUARY. BOTH THESE OUTAGES WERE CAUSED BY THE REHEATER (A COIL LEAK AND A FLANGE LEAK) TOTALING 18 HOURS AND 24 MINUTES.

2/80	A	79.7	90.5		79.7						
	B	78.6	89.2		78.6						
	SYSTEM	74.1	84.2		74.1			696	613	516	

** PROBLEMS/SOLUTIONS/COMMENTS

SCRUBBER PROBLEMS IN FEBRUARY WERE CAUSED FROM LEAKS IN THE VENTURI SPRAY HEADER. THESE LEAKS DEVELOP WHERE THE RUBBER LINING INSIDE THE VENTURI PIPING HAS WORN AWAY SO THAT THE BARE METAL IS EXPOSED. THIS EXPOSED METAL IS THEN SUBJECT TO ERROSION/CORROSION. THE LINING IS MOST LIKELY TO WEAR AT THE WELD HEAD OF THE SPRAY NOZZLE TO THB MAIN HEADER. ALL THE VENTURI SPRAY PIPING IS BEING REPLACED.

TUBE LEAKS IN THE STEAM COIL REHEAT SYSTEM CAUSED SCRUBBER PROBLEMS THIS MONTH. MODULE A WAS FORCED OUT ONCE AND MODULE B WAS FORCED OUT THREE TIMES. THESE TUBES WILL BE REPLACED DURING THE NEXT OUTAGE.

3/80	A	83.9			.0						
	A	83.9			.0						
	SYSTEM	83.9			.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS OUT OF SERVICE FOR ALL OF MARCH DUE TO BOILER TUBE LEAKS IN THE REHEAT SECTION OF THE BOILER.

4/80	A	100.0	71.0		17.3						
	B	87.7	71.0		17.3						
	SYSTEM	93.9	71.4		17.3			720	175	125	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST 15 DAYS OF APRIL THE BOILER WAS OUT OF SERVICE DUE TO TUBE LEAKS IN THE AIR PREHEATER.

WHEN ATTEMPTS WERE MADE TO BRING THE BOILER ON LINE ON THE 16 THE B-MODULE OF THE SO2 SYSTEM DEVELOPED REHEATER TUBE LEAKS. THIS CAUSED A FORCED OUTAGE OF 53 HOURS AND 40 MINUTES.

WHEN ATTEMPTS WERE MADE TO RETURN THE BOILER TO SERVICE AGAIN, THE AUXILIARY LOW PRESSURE GOVENOR DEVELOPED AN OIL LEAK CAUSING A FOUR DAY OUTAGE, FOLLOWED BY ANOTHER REHEATER TUBE LEAK OUTAGE ON THE B MODULE. THIS OUTAGE LASTED 35 HOURS. THE UNIT RETURNED TO SERVICE ON APRIL 24 AND WAS AVAILABLE FOR THE REST OF APRIL.

5/80	SYSTEM							744			

COMMONWEALTH EDISON: WILL COUNTY 1 (CONT.)

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-------------------------------------------PERFORMANCE DATA--------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                               ----- ----- ----- ------ ----- ------
       ** PROBLEMS/SOLUTIONS/COMMENTS

                          INFORMATION WAS NOT AVAILABLE FOR THE MONTH OF MAY.

6/80   A            86.5       100.0                    81.2
       B            86.5       100.0                    81.2
       SYSTEM       86.5       100.0                    81.2                 720   584    584

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE SCRUBBING SYSTEM FORCED THE BOILER OUT OF SERVICE FROM JUNE 6 TO
                          JUNE 10.  THE OUTAGE WAS CAUSED BY PLUGGED REHEATERS ON BOTH MODULES.
                          THIS WAS THE ONLY FORCED OUTAGE EXPERIENCED DURING JUNE.

7/80   A            87.8        78.3                    55.0
       B            87.8        78.3                    55.0
       SYSTEM       87.8        78.3                    55.0                 744   522    409

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING THE MONTH OF JULY THERE WERE NO FORCED SCRUBBER OUTAGES.

                          TWO SLAG LINE OUTAGES, ONE FORCED DRAFT FAN AND ONE BOILER SCREEN WALL
                          TUBE OUTAGE OCCURRED.  THIS ACCOUNTED FOR 193 HOURS OF BOILER-RELATED
                          OUTAGE TIME DURING THE MONTH.

                          ON NINE OCCASIONS IN JULY THE SCRUBBER WAS BY-PASSED SO THAT THE BOILER
                          COULD CARRY MAXIMUM LOAD (163 MW).  THE UNIT WAS LIMITED TO 135 MW AFTER
                          A RECENT STACK EMISSION TEST.

8/80   SYSTEM                                                                744

9/80   SYSTEM                                                                720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          NO INFORMATION WAS AVAILABLE FOR THE MONTHS OF AUGUST AND SEPTEMBER.
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SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

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COMPANY NAME                                        DETROIT EDISON
PLANT NAME                                          ST. CLAIR
UNIT NUMBER                                         6
CITY                                                BELLE RIVER
STATE                                               MICHIGAN
GROSS UNIT GENERATING CAPACITY - MW                   260.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW        *******
EQUIVALENT SCRUBBED CAPACITY - MW                     130.0

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                       22330.        ( 9600 BTU/LB)
    AVERAGE ASH CONTENT - %                              4.00
    AVERAGE MOISTURE CONTENT - %                        22.60
    AVERAGE SULFUR CONTENT - %                            .35
    AVERAGE CHLORIDE CONTENT - %                    ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PH CONTROL ADDITIVE                             LIMESTONE
    SYSTEM SUPPLIER                                 PEABODY PROCESS SYSTEMS
    NEW/RETROFIT                                    RETROFIT
    ENERGY CONSUMPTION - %                          *******
    INITIAL START-UP DATE                            6/75
    COMMERCIAL START-UP DATE                         9/75
    TYPICAL SO2 REMOVAL - %                            90.00
    PARTICLE DESIGN REMOVAL EFFICIENCY - %             99.70

** ESP

** MECHANICAL COLLECTOR

** PARTICLE SCRUBBER
    NUMBER                                          2
    TYPE                                            VENTURI


--------------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 1/80  SYSTEM
                                                                            744
 2/80  SYSTEM
                                                                            696
 3/80  SYSTEM
                                                                            744
        ** PROBLEMS/SOLUTIONS/COMMENTS

                        THE SCRUBBING SYSTEM OPERATED WITH BETTER THAN 80% AVAILABILITY DURING THE
                        FIRST QUARTER OF 1980.

                        THE SCRUBBER ID FAN FAILED.  THE BOLTS HOLDING PART OF THE SHROUDING
                        IN PLACE SHEERED CAUSING THE PLATE TO FALL ONTO THE SHAFT.

                        BECAUSE OF ADDITIONAL PROBLEMS WITH THE A-S-H SUMP PUMPS, THE DENVER PUMPS
                        INSTALLED TO ASSIST THE A-S-H PUMPS NOW CARRY THE ENTIRE LOAD.  THE A-S-H
                        PUMPS DRIVES HAVE BEEN DISCONNECTED.  THE SLURRY CIRCULATES THROUGH THE
                        THE NON-OPERATING A-S-H PUMPS TO THE DENVER PUMPS.

                        THE CONTINUAL PROBLEMS WITH THE LOUVER BY PASS DAMPERS WAS SOLVED BY DIS-
                        CONNECTING THE EXTREME LOUVER AT EITHER END.  THE DAMPERS OPERATE NOW WITH
                        12 OF THE 14 LOUVERS.  THE UTILITY IS PLEASED WITH RECENT DAMPER
                        OPERATIONS.

                        SOME RECENT SCRUBBER OUTAGES RESULTED FROM THE OCCASIONAL UNAVAILABILITY
                        OF LIMESTONE.

 4/80  SYSTEM
                                                                            720
```

DETROIT EDISON: ST. CLAIR 6 (CONT.)

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-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

          ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE SCRUBBER WAS OUT OF SERVICE THROUGH APRIL WHILE REPAIRS CONTINUED ON
                              THE SCRUBBER ID FAN HOUSING.  BECAUSE BOILER OPERATED AT LOW LOAD THE
                              SCRUBBER SERVICES WERE NOT REQUIRED IN APRIL.

 5/80  SYSTEM                                                                   744

          ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE SCRUBBER WAS OUT OF SERVICE UNTIL MAY 21 WHEN THE FAN HOUSING REPAIR
                              WAS COMPLETED.  THE SCRUBBER WAS SHUT DOWN AGAIN ON MAY 25 WITH A SCRUBBER
                              ID FAN BEARING FAILURE.

 6/80  SYSTEM                                                                   720

          ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE SCRUBBER WAS NOT OPERATED THROUGH JUNE BECAUSE PARTS FOR THE SCRUBBER
                              ID FAN HAD NOT ARRIVED AT THE PLANT.  SCRUBBER SERVICE WAS NOT REQUIRED
                              BECAUSE OF LOW BOILER LOAD.

                              SCRUBBER REPAIRS AT ST CLAIR REQUIRE MORE OUTAGE TIME THAN ONE WOULD EXPECT
                              BECAUSE THE UTILITY DOES NOT STOCK A GREAT DEAL OF PARTS FOR THE SCRUBBER.
                              THE ST CLAIR 6 SCRUBBER IS SCHEDULED TO BE PERMANENTLY REMOVED FROM SERVICE
                              IN SEPTEMBER 1981 WHEN THE NEW 100% CAPACITY ESP FACILITY CURRENTLY UNDER
                              CONSTRUCTION IS COMPLETE.  AT PRESENT 50% OF THE FLUE GAS IS SCRUBBED AND
                              50% PASSES THROUGH THE ESP.  DURING LOW LOAD PERIODS EITHER THE SCRUBBER OR
                              ESP CAN BE SHUT DOWN.

 7/80  SYSTEM                                                                   744

 8/80  SYSTEM                                                                   744

 9/80  SYSTEM                                                                   720

          ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE SCRUBBING SYSTEM DID NOT OPERATE DURING THE JULY THROUGH SEPTEMBER
                              PERIOD.  THE UTILITY IS WAITING ON A UNIT OUTAGE TO PERFORM THE NECESSARY
                              REPAIRS ON THE BOOSTER FAN AND TO REPAIR SOME MINOR SCRUBBER INTERNAL
                              PROBLEMS.
```

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MINNESOTA POWER & LIGHT
PLANT NAME	CLAY BOSWELL
UNIT NUMBER	3
CITY	COHASSET
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	364.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	347.1
EQUIVALENT SCRUBBED CAPACITY - MW	350.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19538. (8400 BTU/LB)
AVERAGE ASH CONTENT - %	9.00
AVERAGE MOISTURE CONTENT - %	26.00
AVERAGE SULFUR CONTENT - %	.92
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	KREBS ENGINEERS
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	.8
INITIAL START-UP DATE	1/73
COMMERCIAL START-UP DATE	5/73
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.70
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	0
** MECHANICAL COLLECTOR	
NUMBER	0
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	SPRAY IMPINGEMENT TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SCRUBBER EXPERIENCED NO PROBLEMS DURING THE 1ST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO SCRUBBER-RELATED OUTAGES OCCURRED DURING THE SECOND QUARTER OF 1980. DOWN TIME FOR MAINTENANCE WAS NOT REQUIRED SINCE GENERAL MAINTENANCE CAN BE PERFORMED ON THE MINNESOTA POWER AND LIGHT PARTICLE SCRUBBERS WHILE THEY ARE IN SERVICE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM		100.0	100.0	90.3			720	650	650	60.2
8/80	SYSTEM		100.0	100.0	78.0			744	580	580	52.3

MINNESOTA POWER & LIGHT: CLAY BOSWELL 3 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM		100.0	100.0	84.0			744	625	625	54.8

** PROBLEMS/SOLUTIONS/COMMENTS

NO OPERATIONAL PROBLEMS WERE REPORTED FOR THE JULY THROUGH SEPTEMBER PERIOD.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MINNESOTA POWER & LIGHT
PLANT NAME	SYL LASKIN
UNIT NUMBER	1
CITY	AURORA
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	62.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	57.3
EQUIVALENT SCRUBBED CAPACITY - MW	58.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20469. (8800 BTU/LB)
AVERAGE ASH CONTENT - %	9.00
AVERAGE MOISTURE CONTENT - %	26.70
AVERAGE SULFUR CONTENT - %	1.00
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	KREBS ENGINEERS
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	1.1
INITIAL START-UP DATE	6/71
COMMERCIAL START-UP DATE	6/71
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.70
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	0
TYPE	NONE
** MECHANICAL COLLECTOR	
NUMBER	0
TYPE	NONE
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	SPRAY IMPINGEMENT TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SCRUBBER EXPERIENCED NO PROBLEMS DURING THE 1ST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO SCRUBBER-RELATED OUTAGES OCCURRED DURING THE SECOND QUARTER OF 1980. DOWN TIME FOR MAINTENANCE WAS NOT REQUIRED SINCE GENERAL MAINTENANCE CAN BE PERFORMED ON THE MINNESOTA POWER AND LIGHT PARTICLE SCRUBBERS WHILE THEY ARE IN SERVICE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	100.0	100.0	100.0	56.6			744	421	421	25.2
8/80	SYSTEM	100.0	100.0	100.0	19.0			744	140	140	12.0

MINNESOTA POWER & LIGHT: SYL LASKIN 1 (CONT.)

```
-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                 THE UTILITY REPORTED THAT NO BOILER OR FGD-RELATED PROBLEMS WERE ENCOUNTER-
                                 ED DURING JULY AND AUGUST.  LOW UTILIZATION FACTORS WERE DUE TO A LACK
                                 OF POWER DEMAND.

 9/80  SYSTEM      100.0       100.0       100.0         4.4                    720    33     33    1.9

       ** PROBLEMS/SOLUTIONS/COMMENTS

                                 NO SCRUBBER OUTAGES OCCURRED DURING SEPTEMBER.  THE LOW UTILIZATION FACTOR
                                 WAS AGAIN THE RESULT OF A LACK OF DEMAND FOR POWER.
```

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MINNESOTA POWER & LIGHT
PLANT NAME	SYL LASKIN
UNIT NUMBER	2
CITY	AURORA
STATE	MINNESOTA
GROSS UNIT GENERATING CAPACITY - MW	62.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	57.3
EQUIVALENT SCRUBBED CAPACITY - MW	58.0
**** FUEL DATA**	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	20469. (8800 BTU/LB)
AVERAGE ASH CONTENT - %	9.00
AVERAGE MOISTURE CONTENT - %	26.70
AVERAGE SULFUR CONTENT - %	1.00
AVERAGE CHLORIDE CONTENT - %	.01
**** GENERAL EMISSION CONTROL SYSTEM DATA**	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	KREBS ENGINEERS
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	1.1
INITIAL START-UP DATE	6/71
COMMERCIAL START-UP DATE	6/71
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.70
**** FABRIC FILTER**	
NUMBER	0
TYPE	NONE
**** ESP**	
NUMBER	0
TYPE	NONE
**** MECHANICAL COLLECTOR**	
NUMBER	0
TYPE	NONE
**** PARTICLE SCRUBBER**	
NUMBER	1
TYPE	SPRAY IMPINGEMENT TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT THE SCRUBBER EXPERIENCED NO PROBLEMS DURING THE 1ST QUARTER OF 1980.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO SCRUBBER-RELATED OUTAGES OCCURRED DURING THE SECOND QUARTER OF 1980. DOWN TIME FOR MAINTENANCE WAS NOT REQUIRED SINCE GENERAL MAINTENANCE CAN BE PERFORMED ON THE MINNESOTA POWER AND LIGHT PARTICLE SCRUBBERS WHILE THEY ARE IN SERVICE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	100.0	100.0	100.0	24.5			744	182	182	12.3

```
-------------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE BOILER DID NOT OPERATE MOST OF JULY DUE TO A BOILER INSPECTION.  NO
                           PROBLEMS WERE ENCOUNTERED WITH THE FGD UNIT.

 8/80  SYSTEM      100.0       100.0       100.0       15.0                    744   115    115   5.0

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE BOILER OPERATED ONLY 115 HOURS DURING AUGUST DUE TO A LACK OF DEMAND.

 9/80  SYSTEM      100.0       100.0       100.0        5.2                    720    39     39   2.4

       ** PROBLEMS/SOLUTIONS/COMMENTS

                           THE UTILITY REPORT THAT NO SCRUBBER OUTAGES OCCURRED DURING SEPTEMBER.
                           THE LOW UTILIZATION FACTOR RESULTED FROM A LACK OF DEMAND FOR
                           POWER.
```

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	MONTANA-DAKOTA UTILITIES	
PLANT NAME	LEWIS & CLARK	
UNIT NUMBER	1	
CITY	SIDNEY	
STATE	MONTANA	
GROSS UNIT GENERATING CAPACITY - MW	55.1	
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	50.3	
EQUIVALENT SCRUBBED CAPACITY - MW	55.1	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	LIGNITE	
AVERAGE HEAT CONTENT - J/G	15003.	(6450 BTU/LB)
AVERAGE ASH CONTENT - %	7.80	
AVERAGE MOISTURE CONTENT - %	36.20	
AVERAGE SULFUR CONTENT - %	.61	
AVERAGE CHLORIDE CONTENT - %	.03	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PH CONTROL ADDITIVE	LIMESTONE	
SYSTEM SUPPLIER	RESEARCH-COTTRELL	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	2.2	
INITIAL START-UP DATE	**/**	
COMMERCIAL START-UP DATE	12/75	
TYPICAL SO2 REMOVAL - %	.00	
PARTICLE DESIGN REMOVAL EFFICIENCY - %	98.00	
** MECHANICAL COLLECTOR		
NUMBER	1	
TYPE	MULTICLONES	
** PARTICLE SCRUBBER		
TYPE	VENTURI	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE JANUARY THROUGH MARCH PERIOD THE SCRUBBER WAS AVAILABLE MORE THAN 95% OF THE TIME.

THE EROSION PROBLEM MENTIONED DURING NOVEMBER CONTINUED. SECTIONS OF THE LINED CARBON STEEL COLUMN WALL SUPPORTING THE FLOODED DISC WERE RUPTURING, FILLING THE INNER CHAMBER WITH SLURRY AND ULTIMATELY RENDERING THE DISC MOVEMENT MECHANISM INOPERATIVE. THE UTILITY HAS MANAGED TO KEEP THE SCRUBBER OPERATING AS A STOP-GAP MEASURE BETWEEN UNIT SHUTDOWNS BY INSERTING A GARDEN HOSE IN THE COLUMN HOLES AND CONTINUALLY FLUSHING THE INNER CHAMBER. THE UTILITY HAS HAD SOME SUCCESS IN OTHER EROSION AREAS BY MAKING REPAIRS WITH A HASTELLOY MATERIAL. PLANS ARE BEING MADE TO JACKET THE ENTIRE DISC SUPPORT COLUMN WITH HASTELLOY G.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN FOR TWO WEEKS IN MAY.

CREWS INSPECTING THE SCRUBBING SYSTEM DISCOVERED THAT THE NINE FOOT SCRUBBER LINER SECTION AT THE BOTTOM OF THE CYCLONIC MIST ELIMINATOR WAS SEVERE-

MONTANA-DAKOTA UTILITIES: LEWIS & CLARK 1 (CONT.)

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---------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ---- ----- ----- ------ ----- ------
                         LY ERRODED.  THE LINER HAS LASTED THREE YEARS.  THE UTILITY CONSIDERS THIS
                         A NORMAL MAINTENANCE PROBLEM.  AT ONE TIME LINERS IN THIS SECTION WERE RE-
                         PLACED EVERY SIX MONTHS.  REPLACEMENT WORK ON THE LATEST FAILURE IS EXPECT-
                         ED TO BEGIN BY JULY 21.

                         THE ENTIRE SCRUBBER COLUMN SUPPORTING THE DISC WHICH WAS ERODING AS REPORT-
                         ED DURING THE PREVIOUS TWO QUARTERS HAS BEEN CLAD WITH HASTELLOY G.

                         THE UTILITY REPORTED THAT THE SCRUBBER HAS EXPERIENCED PLUGGING AT WET/DRY
                         INTERFACES WITHIN THE STRUCTURE.  IT APPEARS THAT THIS IS RELATED TO COAL
                         SULFUR CONTENT.  WHEN THE SULFUR CONTENT IS RELATIVELY HIGH (0.7 TO 1.0% AT
                         LEWIS AND CLARK) THE PLUGGING DOES NOT OCCUR.  LIMESTONE IS ADDED AS RE-
                         QUIRED TO PREVENT THE OCCURRANCE OF LOW PH LEVELS.  WHEN THE SULFUR CONTENT
                         FALLS TO THE 0.3% RANGE THE PH RISES AS A RESULT OF THE ALKALINE CONSTITU-
                         ENTS IN THE FLY ASH UNTIL SOFT SCALE PLUGGING RESULTS.  THE UTILITY HAS
                         CONSIDERED ADDING ACID TO STABILIZE THE PH WHEN THE COAL SULFUR CONTENT
                         DROPS.

 7/80  SYSTEM
                                                                            744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         DURING JULY TWO WEEKS OF DOWN TIME WAS NECESSARY TO REPLACE THE MIST
                         ELIMINATOR LINER.

                         THE PROBLEM WITH THE FLOODED DISC BUILDUP MENTIONED EARLIER CONTINUED.
                         THE UTILITY PERFORMS THE NECESSARY REPAIRS IN THREE TO FOUR HOURS WHEN
                         THIS OCCURS.

 8/80  SYSTEM
                                                                            744

 9/80  SYSTEM
                                                                            720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                         THE UTILITY REPORTED THAT NO MAJOR PROBLEMS WERE ENCOUNTERED WITH SCRUBBING
                         OPERATIONS DURING THE MONTHS OF AUGUST AND SEPTEMBER.
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                                             SECTION 14
                         DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS
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COMPANY NAME                                           PACIFIC POWER & LIGHT
PLANT NAME                                             DAVE JOHNSTON
UNIT NUMBER                                            4
CITY                                                   GLENROCK
STATE                                                  WYOMING
GROSS UNIT GENERATING CAPACITY - MW                      330.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW             326.5
EQUIVALENT SCRUBBED CAPACITY - MW                        330.0

** FUEL DATA
    FUEL TYPE                                          COAL
    FUEL GRADE                                         SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                          17282.        (  7430 BTU/LB)
    AVERAGE ASH CONTENT - %                                12.00
    AVERAGE MOISTURE CONTENT - %                           26.00
    AVERAGE SULFUR CONTENT - %                               .50
    AVERAGE CHLORIDE CONTENT - %                             .04

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                               WET SCRUBBING
    PH CONTROL ADDITIVE                                LIME/ALKALINE FLYASH
    SYSTEM SUPPLIER                                    CHEMICO DIVISION, ENVIROTECH
    NEW/RETROFIT                                       RETROFIT
    ENERGY CONSUMPTION - %                                 1.1
    INITIAL START-UP DATE                               4/72
    COMMERCIAL START-UP DATE                           **/**
    TYPICAL SO2 REMOVAL - %                            ********
    PARTICLE DESIGN REMOVAL EFFICIENCY - %             ********

** PARTICLE SCRUBBER
    NUMBER                                              3
    TYPE                                               VENTURI


-------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  SYSTEM
                                                                            744
 2/80  SYSTEM
                                                                            696
 3/80  SYSTEM
                                                                            744
       ** PROBLEMS/SOLUTIONS/COMMENTS

                 NO INFORMATION WAS AVAILABLE FOR THE FIRST QUARTER OF 1980.

 4/80  SYSTEM
                                                                            720
 5/80  SYSTEM
                                                                            744
 6/80  SYSTEM
                                                                            720
       ** PROBLEMS/SOLUTIONS/COMMENTS

                 THE UTILITY REPORTED THAT NO MAJOR PROBLEMS OCCURRED DURING THE SECOND
                 QUARTER OF 1980.

 7/80  SYSTEM
                                                                            744
 8/80  SYSTEM
                                                                            744
 9/80  SYSTEM
                                                                            720
       ** PROBLEMS/SOLUTIONS/COMMENTS

                 NO INFORMATION WAS AVAILABLE FOR THE THIRD QUARTER OF 1980.
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SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	POTOMAC ELECTRIC POWER	
PLANT NAME	DICKERSON	
UNIT NUMBER	1	
CITY	DICKERSON	
STATE	MARYLAND	
GROSS UNIT GENERATING CAPACITY - MW	190.0	
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	183.0	
EQUIVALENT SCRUBBED CAPACITY - MW	*******	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	27214.	(11700 BTU/LB)
AVERAGE ASH CONTENT - %	14.00	
AVERAGE MOISTURE CONTENT - %	********	
AVERAGE SULFUR CONTENT - %	2.00	
AVERAGE CHLORIDE CONTENT - %	********	
** GENERAL EMISSION CONTROL SYSTEM DATA		
GENERAL PROCESS TYPE	WET SCRUBBING	
PH CONTROL ADDITIVE		
SYSTEM SUPPLIER		
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	**/**	
COMMERCIAL START-UP DATE	0/78	
TYPICAL SO2 REMOVAL - %	********	
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.00	
** ESP		
TYPE	COLD SIDE	
** PARTICLE SCRUBBER		
TYPE	VENTURI	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0	100.0		100.0			744	744	744	
2/80	SYSTEM	94.3	95.8		94.3			696	685	656	
3/80	SYSTEM	100.0	100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980 ONLY ONE SCRUBBER OUTAGE OCCURRED. IN FEBRUARY OUTAGE TIME WAS NECESSARY TO REPAIR A SLURRY RECYCLE LINE LEAK.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DICKERSON 1 SCRUBBER DEPENDABILITY FACTORS WERE UNAVAILABLE FOR THE APRIL-JUNE PERIOD. THESE FIGURES SHOULD BE AVAILABLE BY THE THIRD QUARTER REPORT. THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED THE ENTIRE SECOND QUARTER WITH ESSENTIALLY 100% AVAILABILITY. NO SCRUBBER-RELATED PROBLEMS WERE REPORTED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

POTOMAC ELECTRIC POWER: DICKERSON 1 (CONT.)

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL		PER	BOILER	FGD	CAP.
						SO2	PART.	HOURS	HOURS	HOURS	FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS NOT FIGURED OUT THE DEPENDABILITY FIGURES AS YET.

THE UTILITY REPORTED HAVING MINIMAL SCRUBBING SYSTEM PROBLEMS DURING THE JULY-SEPTEMBER PERIOD.

THE BOILER CAPACITY WAS REDUCED DURING PART OF THE PERIOD DUE TO A LINING FAILURE IN THE SCRUBBING SYSTEM PIPING.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	POTOMAC ELECTRIC POWER
PLANT NAME	DICKERSON
UNIT NUMBER	2
CITY	DICKERSON
STATE	MARYLAND
GROSS UNIT GENERATING CAPACITY - MW	190.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	183.0
EQUIVALENT SCRUBBED CAPACITY - MW	*******
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	******
AVERAGE HEAT CONTENT - J/G	27214. (11700 BTU/LB)
AVERAGE ASH CONTENT - %	14.00
AVERAGE MOISTURE CONTENT - %	********
AVERAGE SULFUR CONTENT - %	2.00
AVERAGE CHLORIDE CONTENT - %	********
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	
SYSTEM SUPPLIER	
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	**/**
COMMERCIAL START-UP DATE	0/78
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.00
** ESP	
TYPE	COLD SIDE
** PARTICLE SCRUBBER	
TYPE	VENTURI

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	95.4	96.4		95.4			744	736	710	

** PROBLEMS/SOLUTIONS/COMMENTS

IN JANUARY THE SCRUBBER WAS DOWN FOR THREE HOURS TO REPAIR A SLURRY RECYCLE LINE LEAK.

31 HOURS OF THE OUTAGE TIME IN JANUARY WAS NECESSARY TO REPAIR A RECYCLE PUMP.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	100.0	100.0		100.0			696	696	696	
3/80	SYSTEM	96.9	96.9		96.9			744	744	721	

** PROBLEMS/SOLUTIONS/COMMENTS

IN MARCH THE SCRUBBER WAS DOWN FOR A SCRUBBER LINING WARRANTY INSPECTION. NO REPAIR WORK WAS NECESSARY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

DICKERSON 2 SCRUBBER DEPENDABILITY FACTORS WERE UNAVAILABLE FOR THE APRIL-JUNE PERIOD. THESE FIGURES SHOULD BE AVAILABLE BY THE THIRD QUARTER REPORT. THE UTILITY REPORTED THAT THE FGD SYSTEM OPERATED THE ENTIRE SECOND QUARTER WITH ESSENTIALLY 100% AVAILABILITY. NO SCRUBBER-RELATED PROBLEMS WERE REPORTED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			

POTOMAC ELECTRIC POWER: DICKERSON 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS NOT FIGURED OUT THE DEPENDABILITY FIGURES AS YET.

THE UTILITY REPORTED HAVING MINIMAL SCRUBBING SYSTEM PROBLEMS DURING THE JULY-SEPTEMBER PERIOD.

THE BOILER CAPACITY WAS REDUCED DURING PART OF THE PERIOD DUE TO A LINING FAILURE IN THE SCRUBBING SYSTEM PIPING.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	POTOMAC ELECTRIC POWER
PLANT NAME	DICKERSON
UNIT NUMBER	3
CITY	DICKERSON
STATE	MARYLAND
GROSS UNIT GENERATING CAPACITY - MW	190.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	183.0
EQUIVALENT SCRUBBED CAPACITY - MW	*******
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	27214. (11700 BTU/LB)
AVERAGE ASH CONTENT - %	14.00
AVERAGE MOISTURE CONTENT - %	********
AVERAGE SULFUR CONTENT - %	2.00
AVERAGE CHLORIDE CONTENT - %	********
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	
SYSTEM SUPPLIER	
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	9/75
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.30
** ESP	
NUMBER	1
TYPE	COLD SIDE
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	VENTURI

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	78.7	88.2		78.7			744	664	586	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY THE SCRUBBER WAS DOWN TO REPAIR THE FLAKEGLASS LINING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
2/80	SYSTEM	100.0	100.0		100.0			696	696	696	
3/80	SYSTEM	100.0	100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING FEBRUARY AND MARCH THE SCRUBBER OPERATED WITH NO MAJOR PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE UNIT 3 SCRUBBER EXPERIENCED SOME DOWN TIME DURING THE APRIL-JUNE PERIOD AS A RESULT OF THE CONTINUING DETERIORATION OF THE SCRUBBER FLAKEGLASS LINING. THE UTILITY REPORTED THAT MAINTENANCE CREWS ARE PATCHING OLD PATCHES. A STUDY WILL BEGIN IN LATE JULY TO ESTABLISH THE OPTIMUM LINER MATERIAL AND APPLICATION STRATEGY FOR THE UNIT 3 SCRUBBING SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

EPA UTILITY FGD SURVEY: JULY - SEPTEMBER 1980

POTOMAC ELECTRIC POWER: DICKERSON 3 (CONT.)

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------------------------------------------PERFORMANCE DATA----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------
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** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY HAS NOT FIGURED OUT THE DEPENDABILITY FIGURES AS YET.

THE UTILITY REPORTED HAVING MINIMAL SCRUBBING SYSTEM PROBLEMS DURING THE JULY-SEPTEMBER PERIOD.

THE BOILER CAPACITY WAS REDUCED TO 1/2 LOAD DURING PART OF THE PERIOD DUE TO THE NECESSARY PATCHING OF THE SCRUBBER LINING. THE UTILITY IS PRESENTLY STUDYING THE POSSIBILITY OF REPLACING THE FLAKEGLASS LINER WITH A RUBBER LINER.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PUBLIC SERVICE OF COLORADO
PLANT NAME	ARAPAHOE
UNIT NUMBER	4
CITY	DENVER
STATE	COLORADO
GROSS UNIT GENERATING CAPACITY - MW	112.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	109.8
EQUIVALENT SCRUBBED CAPACITY - MW	112.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	23725. (10200 BTU/LB)
AVERAGE ASH CONTENT - %	9.30
AVERAGE MOISTURE CONTENT - %	13.70
AVERAGE SULFUR CONTENT - %	.95
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	9/73
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	1
** MECHANICAL COLLECTOR	
NUMBER	1
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE MODULE ISOLATION PROBLEMS CONTINUED THROUGH THE FIRST QUARTER OF 1980. USE OF THE CARBON STEEL DAMPERS HAS BEEN ABANDONED. THE PROGRAM FOR REPLACING THE DAMPERS HAS BEEN SUSPENDED INDEFINITELY. THE UNIT IS SHUTDOWN WHEN MAJOR SCRUBBER PROBLEMS OCCUR.

REHEATER STEAM TUBE LEAKS ARE STILL CAUSING PROBLEMS. THE SIX STEAM COILS ON THIS IN-LINE REHEAT SYSTEM, TWO OF WHICH ARE 316SS AND FOUR OF WHICH ARE CARBON STEEL, ARE EXPERIENCING CORROSION PROBLEMS. A SOLUTION TO THE PROBLEM HAS NOT YET BEEN DETERMINED.

IN FEBRUARY THE UTILITY REPLACED THE SCRUBBER BALLS AND GRIDS. THE OLD BALLS WERE REPLACED WITH THE NEW HOLLOW HARD PLASTIC-WALLED BALLS WITH NOTCHED SEAMS. THE GRIDS WERE ORIGINALLY 316L SS, CERAMIC, POLYPROPYLENE, AND RUBBER LINED CARBON STEEL, BUT HAVE BEEN REPLACED WITH 317L SS GRIDS.

THE SCRUBBERS OPERATED CONTINUOUSLY THROUGHOUT THE QUARTER EXCEPT FOR THE BALL AND GRID REPLACEMENT DOWNTIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM		100.0		100.0			720	720	720	

PUBLIC SERVICE OF COLORADO: ARAPAHOE 4 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM		100.0		100.0			744	744	744	
6/80	SYSTEM		100.0		100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

BOTH BOILER AND SCRUBBERS OPERATED THE ENTIRE APRIL-JUNE PERIOD.

THE ISOLATION DAMPERS ARE STILL EFFECTIVELY INOPERABLE AND A REPLACEMENT PLAN AS YET HAS NOT BEEN REESTABLISHED.

THE UTILITY REPORTED THAT THE REHEATER TUBE LEAK PROBLEM CONTINUED THROUGH THE SECOND QUARTER. THE TUBES WILL BE ENTIRELY REPLACED WITH NEW 316L SS BUNDLES DURING THE NEXT SCHEDULED OUTAGE IN NOVEMBER AND DECEMBER. DURING THE SECOND QUARTER MORE TUBES WERE BLANKED OFF AFTER STEAM LEAKS OCCURRED. TO DATE ROUGHLY 50% OF THE TUBES ARE SEALED OFF AND ARE OUT OF SERVICE BECAUSE OF LEAKS THAT OCCURRED OVER THE PAST MONTHS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
8/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
9/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND SCRUBBERS OPERATED ACCEPTABLY DURING THE JULY-SEPTEMBER PERIOD. NO PLANS HAVE BEEN MADE TO REPAIR THE ISOLATION DAMPERS. THE FAULTY REHEATER TUBES WILL BE REPLACED DURING THE SCHEDULED OUTAGE NOW SET FOR THE FIRST THREE WEEKS OF DECEMBER.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PUBLIC SERVICE OF COLORADO
PLANT NAME	CHEROKEE
UNIT NUMBER	1
CITY	DENVER
STATE	COLORADO
GROSS UNIT GENERATING CAPACITY - MW	115.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	100.0
EQUIVALENT SCRUBBED CAPACITY - MW	102.2
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	23493. (10100 BTU/LB)
AVERAGE ASH CONTENT - %	12.50
AVERAGE MOISTURE CONTENT - %	11.30
AVERAGE SULFUR CONTENT - %	.65
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	4.3
INITIAL START-UP DATE	6/73
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	1
** MECHANICAL COLLECTOR	
NUMBER	1
** PARTICLE SCRUBBER	
NUMBER	1
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM		100.0		100.0			744	744	744	
2/80	SYSTEM		100.0		100.0			696	696	696	
3/80	SYSTEM		100.0		100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBERS OPERATED CONTINUOUSLY THROUGHOUT THE FIRST QUARTER OF 1980.

THE ISOLATION DAMPERS HAVE NOT CAUSED ANY PROBLEMS BECAUSE MODULE ISOLATION WAS NOT REQUIRED DURING THE PERIOD.

THE FANS ARE STILL EXPERIENCING EROSION PROBLEMS.

IN MARCH A BOILER/SCRUBBER OVERHAUL BEGAN. DURING THIS TIME THE CARBON STEEL ISOLATION DAMPERS WILL BE REPLACED WITH 316 SS. THE NEW FANS WILL BE INSTALLED IN THE OLD HOUSINGS. THE NEW HIGH STRENGTH CARBON STEEL FANS WILL BE EQUIPPED WITH REPLACABLE CHROMIUM ALLOY WEAR PLATE BLADE TIPS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

PUBLIC SERVICE OF COLORADO: CHEROKEE 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

THE 1B ID FAN WAS SEVERELY ERRODED. THE FAN WAS REBUILT DURING THE OUTAGE.

THE OLD CARBON STEEL ISOLATION DAMPERS WERE REPLACED WITH 316 SS DAMPERS DURING THE CONTINUING MAY-JULY OUTAGE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

SHAFT BEARING FAILURES ON THE RECIRCULATION PUMP CAUSED SCRUBBER SYSTEM PROBLEMS THROUGHOUT THE JULY-SEPTEMBER PERIOD.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	PUBLIC SERVICE OF COLORADO
PLANT NAME	CHEROKEE
UNIT NUMBER	4
CITY	DENVER
STATE	COLORADO
GROSS UNIT GENERATING CAPACITY - MW	375.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	350.0
EQUIVALENT SCRUBBED CAPACITY - MW	356.4
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	BITUMINOUS
AVERAGE HEAT CONTENT - J/G	23493. (10100 BTU/LB)
AVERAGE ASH CONTENT - %	12.50
AVERAGE MOISTURE CONTENT - %	11.30
AVERAGE SULFUR CONTENT - %	.65
AVERAGE CHLORIDE CONTENT - %	.01
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	ALKALINE FLYASH
SYSTEM SUPPLIER	AIR CORRECTION DIVISION, UOP
NEW/RETROFIT	RETROFIT
ENERGY CONSUMPTION - %	6.7
INITIAL START-UP DATE	7/74
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	********
PARTICLE DESIGN REMOVAL EFFICIENCY - %	********
** FABRIC FILTER	
NUMBER	0
TYPE	NONE
** ESP	
NUMBER	1
** MECHANICAL COLLECTOR	
NUMBER	1
** PARTICLE SCRUBBER	
NUMBER	4
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

THE OUTLET DUCT WORK IS BEING REBUILT INTERNALLY WITH FIBERGLASS FOR STRUCTURAL SUPPORT AND ACID RESISTANCE. WITH REGULAR MAINTENANCE THE UTILITY EXPECTS THIS TO PROVE TO BE A PERMANENT SOLUTION TO THE EROSION/CORROSION PROBLEM.

THE OLD FANS ARE BEING REPLACED WITH HIGH STRENGTH CARBON STEEL FANS HAVING REPLACABLE CHROMIUM ALLOY WEAR PLATE BLADE TIPS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM							720			
5/80	SYSTEM							744			
6/80	SYSTEM							720			

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----------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
------ ------ ------------ ----------- ----------- -----------  SO2  PART. HOURS HOURS  HOURS FACTOR
                                                                ----- ----- ----- ------ ----- ------
       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE NEW FANS DESCRIBED DURING THE LAST REPORT PERIOD WERE INSTALLED IN ONE
                              OF THE FOUR MODULES.  NEW FANS WILL BE INSTALLED IN THE OTHER THREE MODULES
                              DURING A SCHEDULED LATE SEPTEMBER OUTAGE UNLESS THE UTILITY HAS AN OPPOR-
                              TUNITY TO MAKE THE REPLACEMENTS SOONER.

 7/80  SYSTEM
                                                                             744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE SCRUBBER RETURNED TO SERVICE IN MID JULY AFTER A TWO WEEK OUTAGE.
                              DURING THIS TIME, THE FIBERGLASS INSIDE THE DUCTWORK WAS REPLACED, AND A
                              VERTICAL GRID WAS INSTALLED ON THE SECOND LEVEL OF THE MOBILE BED TOWER TO
                              IMPROVE SYSTEM PERFORMANCE.

 8/80  SYSTEM
                                                                             744

 9/80  SYSTEM
                                                                             720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                              THE BOILER AND FGD SYSTEM WENT DOWN ON SEPTEMBER 15, 1980 FOR A SCHEDULED
                              OVERHAUL.  DURING THIS TIME, FANS WERE INSTALLED ON MODULES A, C, AND D.

                              THE UTILITY IS CURRENTLY EVALUATING THE VERTICAL GRID ON THE SECOND LAYER.
                              IF THE GRID IMPROVES SYSTEM PERFORMANCE, THEY WILL INSTALL ANOTHER ONE
                              ON THE THIRD LEVEL.
```

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

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COMPANY NAME                                       PUBLIC SERVICE OF COLORADO
PLANT NAME                                         VALMONT
UNIT NUMBER                                        5
CITY                                               VALMONT
STATE                                              COLORADO
GROSS UNIT GENERATING CAPACITY - MW                  166.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW         157.0
EQUIVALENT SCRUBBED CAPACITY - MW                    166.0

** FUEL DATA
    FUEL TYPE                                      COAL
    FUEL GRADE                                     SUBBITUMINOUS
    AVERAGE HEAT CONTENT - J/G                      25121.         ( 10800 BTU/LB)
    AVERAGE ASH CONTENT - %                            6.00
    AVERAGE MOISTURE CONTENT - %                      15.00
    AVERAGE SULFUR CONTENT - %                          .70
    AVERAGE CHLORIDE CONTENT - %                   ********

** GENERAL EMISSION CONTROL SYSTEM DATA
    GENERAL PROCESS TYPE                           WET SCRUBBING
    PH CONTROL ADDITIVE                            LIMESTONE/ALKALINE FLYASH
    SYSTEM SUPPLIER                                UOP/PUBLIC SERVICE OF COLORADO
    NEW/RETROFIT                                   RETROFIT
    ENERGY CONSUMPTION - %                             3.6
    INITIAL START-UP DATE                          11/71
    COMMERCIAL START-UP DATE                       10/74
    TYPICAL SO2 REMOVAL - %                           85.00
    PARTICLE DESIGN REMOVAL EFFICIENCY - %            95.00

** FABRIC FILTER
    NUMBER                                           0
    TYPE                                           NONE

** ESP
    NUMBER                                           1
    TYPE                                           COLD SIDE

** MECHANICAL COLLECTOR
    NUMBER                                           1

** PARTICLE SCRUBBER
    NUMBER                                           2
    TYPE                                           MOBILE PACKED TOWER


---------------------------------------------PERFORMANCE DATA---------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- -----------  ----- ----- ----- ------ ----- ------

 1/80  A           98.5
       B           98.5
       SYSTEM      98.5                                                    744

 2/80  A           84.4
       B           94.9
       SYSTEM      89.7                                                    696

 3/80  A           90.8
       B           87.7
       SYSTEM      89.0                                                    744   615

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          DURING THE FIRST QUARTER OF 1980, NO MAJOR PROBLEMS WERE ENCOUNTERED WITH
                          THE SCRUBBER.

 4/80  A           88.1
       B           88.1
       SYSTEM      88.1                                                    720   716

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE SCRUBBER WAS SHUT DOWN ON APRIL 14 FOR A WEEK TO MAKE REPAIRS TO A HOLE
                          IN THE SCRUBBER RUBBER LINING, RECYCLE PUMP LININGS AND A STEAM REGULATOR
                          ON ONE OF THE REHEATERS.
```

PUBLIC SERVICE OF COLORADO: VALMONT 5 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	A	96.8									
	B	100.0									
	SYSTEM	98.4						744	744		

** PROBLEMS/SOLUTIONS/COMMENTS

NO PROBLEMS WERE REPORTED FOR MAY.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	A	8.0									
	B	8.0									
	SYSTEM	8.0						720	720		

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SCRUBBER WAS FORCED OUT OF SERVICE WHEN AN INBOARD FAN PEDISTLE BEARING FAILED. THE BEARING SECTION WAS REBUILT.

WHILE FAN REPAIRS WERE IN PROGRESS EXTENSIVE MAINTENANCE WAS PERFORMED ON THE SCRUBBER. MAINTENANCE WORK INCLUDED COMPLETE BALL REPLACEMENT, ADDITIONAL REPAIR WORK ON THE SCRUBBER LINER, REPAIR OF HOLES IN THE TOWER SHELL AND OF A RUPTURED MIST ELIMINATOR WASH LINE AND THE REHEATER WAS CLEANED.

DAMPER JAMMING AT VALMONT HAS OCCURRED PERIODICALLY. SOMETIMES DAMPERS DO NOT READILY CLOSE. THE OPERATOR MUST MOVE THE DAMPER UP AND DOWN UNTIL THE GUILLOTINE SEATS. BECAUSE OF CONTINUOUS FLY ASH ACCUMULATION IT APPEARS THAT THE DAMPERS MUST BE EXERCISED FREQUENTLY TO PREVENT JAMMING.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	5A		48.3		46.6						
	5B		48.3		46.6						
	SYSTEM		48.3		46.6			744	719	347	

** PROBLEMS/SOLUTIONS/COMMENTS

THE SCRUBBER SYSTEM WAS SHUT DOWN BECAUSE OF SCRUBBER BOOSTER FAN BEARING FAILURE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
8/80	5A		87.5		84.8						
	5B		95.6		92.6						
	SYSTEM		91.5		87.7			744	721	660	

** PROBLEMS/SOLUTIONS/COMMENTS

THE RECIRCULATION PUMP MOTOR BEARING FAILED CAUSING SOME MINOR OUTAGE TIME IN AUGUST.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
9/80	SYSTEM				.0			720	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER AND SCRUBBER WERE SHUT DOWN DURING SEPTEMBER FOR SCHEDULED MAINTENANCE.

SECTION 14
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL PARTICLE SCRUBBERS

COMPANY NAME	SOUTHWESTERN PUBLIC SERVICE
PLANT NAME	HARRINGTON
UNIT NUMBER	1
CITY	AMARILLO
STATE	TEXAS
GROSS UNIT GENERATING CAPACITY - MW	360.0
NET UNIT GENERATING CAPACITY W/SCRUBBER - MW	320.0
EQUIVALENT SCRUBBED CAPACITY - MW	360.0
** FUEL DATA	
FUEL TYPE	COAL
FUEL GRADE	SUBBITUMINOUS
AVERAGE HEAT CONTENT - J/G	19538. (8400 BTU/LB)
AVERAGE ASH CONTENT - %	5.00
AVERAGE MOISTURE CONTENT - %	27.10
AVERAGE SULFUR CONTENT - %	.42
AVERAGE CHLORIDE CONTENT - %	********
** GENERAL EMISSION CONTROL SYSTEM DATA	
GENERAL PROCESS TYPE	WET SCRUBBING
PH CONTROL ADDITIVE	LIMESTONE
SYSTEM SUPPLIER	COMBUSTION ENGINEERING
NEW/RETROFIT	NEW
ENERGY CONSUMPTION - %	*******
INITIAL START-UP DATE	4/77
COMMERCIAL START-UP DATE	**/**
TYPICAL SO2 REMOVAL - %	50.00
PARTICLE DESIGN REMOVAL EFFICIENCY - %	99.00
** ESP	
NUMBER	1
TYPE	COLD SIDE
** PARTICLE SCRUBBER	
NUMBER	6
TYPE	MOBILE PACKED TOWER

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING OCTOBER THROUGH DECEMBER, TWO SPRAY PUMP MOTORS FAILED.

THE FRP FLUSH PIPING HAS FAILED CAUSING SOME LEAKING.

PLUGGING IN ONE MARBLE BED WAS ENCOUNTERED WHEN THE CHEMISTRY CONTROL WAS TEMPORARILY LOST.

THE CONE SHAPED EXPANDED METAL (316L SS) SCREENS COVERING THE BED DRAIN PIPES HAVE ERODED AWAY FROM BALL MOVEMENT. THE MARBLE BALLS HAVE BEEN DROPPING INTO THE RECYCLE TANK. WHERE THE UTILITY HAS REPLACED THE METAL SCREEN WITH EXPANDED PLASTIC SCREEN, EROSION HAS NOT OCCURRED.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE FIRST QUARTER OF 1980 THE MIST ELIMINATOR WASH PIPING RUPTURED CAUSING PLUGGING IN SCRUBBERS 4 AND 5. THE UTILITY PLANS TO REPLACE ALL FRP PIPING WITH STEEL. THE RUPTURE ON NO. 5 ALSO DAMAGED THE WATER SUPPLY HEADER.

SOUTHWESTERN PUBLIC SERVICE: HARRINGTON 1 (CONT.)

```
-----------------------------------------PERFORMANCE DATA-----------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------
```

THE MARBLE BED PLUGGING REPORTED DURING THE LAST QUARTER IS NOT YET COMPLETELY CLEARED. THE SOFT SCALE IS GRADUALLY GOING BACK INTO THE SOLUTION. THE PLATE AREA IS CLEAN.

THE DUCT BENEATH THE REHEATER TUBING ON ONE OF THE MODULES HAS CORRODED TO THE POINT THAT HOLES HAVE FORMED. SCALE AND MOISTURE WERE FOUND ON THE PLATE WHERE THE CORROSION FORMED. THE PLATE WAS REMOVED AND A NEW CARBON STEEL PLATE WAS WELDED IN. NO OTHER REHEATER DUCTS HAVE EXPERIENCED ANY SCALE OR MOISTURE ACCUMULATION.

```
 4/80  SYSTEM
                                                                               720
```

** PROBLEMS/SOLUTIONS/COMMENTS

A PUMP LINER FAILURE OCCURRED IN APRIL. THE IMPELLER SHAFT LINER WAS REPAIRED AND REPLACED.

```
 5/80  SYSTEM
                                                                               744
```

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN A FEW DAYS IN LATE APRIL AND 12 TO 14 DAYS IN EARLY MAY FOR AIR PREHEATER REPAIRS.

DURING APRIL AND MAY THE SCRUBBING SYSTEM EXPERIENCED AGITATOR PROBLEMS. THE RECENT PROBLEMS HAVE BEEN RELATED TO BEARING FAILURE, HOWEVER, THE SEALS HAVE BEEN LEAKING AS WELL. THE AGITATORS AT THIS FACILITY ARE SIDE MOUNTED. THE AGITATOR SHAFT ENTERS THE TANK AT ROUGHLY 12 FT BELOW THE FLUID SURFACE. IT APPEARS THAT THE SEAL LEAKING MAY BE ATTRIBUTABLE TO FAULTY INSTALLATION.

```
 6/80  SYSTEM      92.1
                                                                               720   696         79.3
```

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JUNE THE SCRUBBER EXHIBITED AN AVAILABILITY OF 92.1%. THERE WAS GREATER SCRUBBER CAPACITY AVAILABLE THAN REQUIRED BY THE BOILER. NO PROBLEMS WERE REPORTED FOR JUNE.

DAMPER PROBLEMS REPORTED PREVIOUSLY HAVE BEEN ELIMINATED. THE OLD OPERATOR MECHANISMS WERE REPLACED WITH OPERATORS SUPPLIED BY ANOTHER MANUFACTURER.

ONE OF THE MARBLE BEDS IS STILL PARTIALLY PLUGGED. THE MATERIAL SEEMS TO BE HARD CALCIUM SULFATE SCALE. THE SCALE WILL PROBABLY NOT CLEAR FURTHER THROUGH DISSOLUTION DURING NORMAL SCRUBBER OPERATIONS AS HAD BEEN HOPED. ALTHOUGH THE MODULE MUST OPERATE AT LOWER THAN DESIGN GAS FLOW SCRUBBER OPERATIONS ARE NOT HAMPERED OVERALL BECAUSE THE SYSTEM HAS SOME DESIGN SPARE CAPACITY.

THE REHEATER PROBLEM REPORTED PREVIOUSLY HAS OCCURRED ON THREE REHEATERS NOW. THE FAILURE OF THE REHEATER DUCT BOTTOM PANELS MAY BE A RESULT OF AN UNDERSIZED DEFLECTION SHIELD BENEATH THE TUBE BANKS. IT IS ALSO POSSIBLE THAT THE DUCTING WAS IMPROPERLY WELDED.

```
 7/80  SYSTEM
                                                                               744
 8/80  SYSTEM
                                                                               744
 9/80  SYSTEM
                                                                               720
```

** PROBLEMS/SOLUTIONS/COMMENTS

THE UTILITY REPORTED THAT NO MAJOR SCRUBBING SYSTEM PROBLEMS OCCURRED DURING THE THIRD QUARTER 1980.

THE PROBLEM REPORTED EARLIER WITH THE MIST ELIMINATOR WASH PIPING IS PRESENTLY BEING SOLVED BY REPLACING THE PIPING WITH CARBON STEEL.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	CHUGOKU ELECTRIC	
PLANT NAME	SHIMONOSEKI	
UNIT NUMBER	1	
CITY	SHIMONOSEKI	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	175.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	175.0	
EQUIVALENT SCRUBBED CAPACITY - MW	175.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25046.	(10768 BTU/LB)
AVERAGE ASH CONTENT - %	24.60	
AVERAGE MOISTURE CONTENT - %	2.30	
AVERAGE SULFUR CONTENT - %	.59	
AVERAGE CHLORIDE CONTENT - %	.04	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	MITSUBISHI HEAVY INDUSTRIES	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	5/79	
COMMERCIAL START-UP DATE	7/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	85.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	6.8	(108 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION		

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
1/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
2/80	SYSTEM	55.2	100.0	55.2	55.2			696	384	384	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING JANUARY AND THE FIRST HALF OF FEBRUARY THE FGD UNIT OPERATED WITH NO PROBLEMS. THE BOILER WAS TAKEN OFF-LINE ON FEBRUARY 8 FOR SCHEDULED MAINTENANCE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
3/80	SYSTEM	100.0			.0			744	0	0	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER REMAINED DOWN THROUGH MARCH FOR ANNUAL MAINTENANCE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	83.1			720	598	598	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE ANNUAL MAINTENANCE THE SCR (SELECTIVE CATALYTIC REDUCTION OF NOX) UNIT WAS CONNECTED BETWEEN THE BOILER AND AIR PREHEATER. AFTER THE STARTUP ON APRIL 6, COAL ONLY HAS BEEN USED (BEFORE FEBRUARY, COAL AND OIL WERE USED 50:50). EXCEPT FOR A 2 HOUR SHUTDOWN FOR A TURBINE TEST ON APRIL 7, THE FGD SYSTEM HAS OPERATED CONTINUOUSLY WITH NO PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	90.3			744	672	672	

CHUGOKU ELECTRIC: SHIMONOSEKI 1 (CONT.)

```
-------------------------------------------PERFORMANCE DATA-------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD    CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE FGD SYSTEM OPERATED CONTINOUSLY WITH NO PROBLEMS.  A THREE DAY
                          SHUTDOWN FOR INSPECTION OF THE SCR UNIT FROM MAY 16 TO MAY 19 WAS THE
                          ONLY DOWN TIME EXPERIENCED DURING MAY.

 6/80  SYSTEM     100.0       100.0       100.0       100.0                       720    720    720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE FGD SYSTEM OPERATED CONTINOUSLY WITH NO PROBLEMS DURING JUNE.

 7/80  SYSTEM                                                                     744

 8/80  SYSTEM                                                                     744

 9/80  SYSTEM                                                                     720

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.
```

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO	
PLANT NAME	ISOGO	
UNIT NUMBER	1	
CITY	YOKOHAMA	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	265.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	238.0	
EQUIVALENT SCRUBBED CAPACITY - MW	265.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25956.	(11160 BTU/LB)
AVERAGE ASH CONTENT - %	16.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	.60	
AVERAGE CHLORIDE CONTENT - %	********	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	IHI - CHEMICO	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	*******	
INITIAL START-UP DATE	12/75	
COMMERCIAL START-UP DATE	3/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	96.70	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	22.3	(354 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							744			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

ELECTRIC POWER DEVELOPMENT CO: ISOGO 1 (CONT.)

PERFORMANCE DATA

** PROBLEMS/SOLUTIONS/COMMENTS

THE FGD SYSTEM OPERATED ALONG WITH THE BOILER FOR THE ENTIRE MONTH OF APRIL.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	51.6			744	384	384	
6/80	SYSTEM	100.0	100.0	100.0	13.3			720	96	96	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUT DOWN FROM MAY 17 TO JUNE 27 FOR ANNUAL MAINTENANCE. THE FGD SYSTEM WAS OPERATED DURING ALL OF THE BOILER OPERATION IN MAY AND JUNE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO	
PLANT NAME	ISOGO	
UNIT NUMBER	2	
CITY	YOKOHAMA	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	265.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	238.0	
EQUIVALENT SCRUBBED CAPACITY - MW	265.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25958.	(11160 BTU/LB)
AVERAGE ASH CONTENT - %	16.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	.60	
AVERAGE CHLORIDE CONTENT - %	********	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	IHI - CHEMICO	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.0	
INITIAL START-UP DATE	3/76	
COMMERCIAL START-UP DATE	5/76	
SO2 DESIGN REMOVAL EFFICIENCY - %	90.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	96.70	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	22.3	(354 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							744			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	33.3			720	240	240	

ELECTRIC POWER DEVELOPMENT CO: ISOGO 2 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR

** PROBLEMS/SOLUTIONS/COMMENTS

ON MARCH 30 THE BOILER WAS SHUTDOWN FOR ANNUAL MAINTENANCE. THE UNIT REMAINED DOWN THROUGH APRIL 20. WHEN OPERATIONS COMMENCED THE FGD SYSTEM OPERATED WITH THE BOILER FOR THE REST OF THE MONTH.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING MAY AND JUNE THE FGD SYSTEM OPERATED WITH NO REPORTED PROBLEMS.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO	
PLANT NAME	TAKASAGO	
UNIT NUMBER	1	
CITY	TAKASAGO	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	250.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	230.0	
EQUIVALENT SCRUBBED CAPACITY - MW	250.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25958.	(11160 BTU/LB)
AVERAGE ASH CONTENT - %	22.00	
AVERAGE MOISTURE CONTENT - %	7.00	
AVERAGE SULFUR CONTENT - %	1.80	
AVERAGE CHLORIDE CONTENT - %	********	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	MITSUI - CHEMICO	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.2	
INITIAL START-UP DATE	2/75	
COMMERCIAL START-UP DATE	**/**	
SO2 DESIGN REMOVAL EFFICIENCY - %	93.00	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	********	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	13.1	(208 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION		

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	30.0			720	216	216	

ELECTRIC POWER DEVELOPMENT CO: TAKASAGO 1 (CONT.)

```
-----------------------------------------PERFORMANCE DATA-----------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

          ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE BOILER WAS SHUTDOWN ON MARCH 29 FOR ANNUAL MAINTENANCE.  THE UNIT
                                  REMAINED OFF LINE THROUGH APRIL 21.  WHEN OPERATIONS COMMENCED THE FGD
                                  SYSTEM OPERATED WITH THE BOILER FOR THE REST OF THE MONTH.

 5/80  SYSTEM      100.0       100.0       100.0       100.0                     744    744    744

 6/80  SYSTEM      100.0       100.0       100.0       100.0                     720    720    720

          ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE FGD SYSTEM EXPERIENCED NO PROBLEMS DURING THE MAY-JUNE PERIOD.

 7/80  SYSTEM                                                                    744

 8/80  SYSTEM                                                                    744

 9/80  SYSTEM                                                                    720

          ** PROBLEMS/SOLUTIONS/COMMENTS

                                  THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.
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                                     SECTION 15
                 DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS
-----------------------------------------------------------------------------------------------

COMPANY NAME                                        ELECTRIC POWER DEVELOPMENT CO
PLANT NAME                                          TAKASAGO
UNIT NUMBER                                         2
CITY                                                TAKASAGO
STATE                                               JAPAN
GROSS UNIT GENERATING CAPACITY - MW                   250.0
NET UNIT GENERATING CAPACITY W/FGD - MW               230.0
EQUIVALENT SCRUBBED CAPACITY - MW                     250.0

** FUEL DATA
    FUEL TYPE                                       COAL
    FUEL GRADE                                      ******
    AVERAGE HEAT CONTENT - J/G                       25958.       ( 11160 BTU/LB)
    AVERAGE ASH CONTENT - %                            22.00
    AVERAGE MOISTURE CONTENT - %                        7.00
    AVERAGE SULFUR CONTENT - %                          1.80
    AVERAGE CHLORIDE CONTENT - %                    ********

** FGD SYSTEM
    GENERAL PROCESS TYPE                            WET SCRUBBING
    PROCESS TYPE                                    LIMESTONE
    SYSTEM SUPPLIER                                 MITSUI - CHEMICO
    NEW/RETROFIT                                    RETROFIT
    ENERGY CONSUMPTION - %                              3.2
    INITIAL START-UP DATE                            3/76
    COMMERCIAL START-UP DATE                        **/**
    SO2 DESIGN REMOVAL EFFICIENCY - %                  97.00
    PARTICULATE DESIGN REMOVAL EFFICIENCY - %       ********
    ABSORBER SPARE COMPONENTS INDEX                      .0

** WATER LOOP
    TYPE                                            OPEN
    FRESH MAKE-UP WATER - LITER/S                      17.1        (  208 GPM)

** BYPRODUCT
    BYPRODUCT NATURE                                GYPSUM
    DISPOSITION


------------------------------------------PERFORMANCE DATA------------------------------------------
PERIOD MODULE AVAILABILITY OPERABILITY RELIABILITY UTILIZATION  % REMOVAL   PER  BOILER  FGD   CAP.
                                                                SO2  PART. HOURS HOURS  HOURS FACTOR
------ ------ ------------ ----------- ----------- ----------- ----- ----- ----- ------ ----- ------

 4/79  SYSTEM                                                               720

 5/79  SYSTEM                                                               744

 6/79  SYSTEM                                                               720

 7/79  SYSTEM                                                               744

 8/79  SYSTEM                                                               744

 9/79  SYSTEM                                                               720

10/79  SYSTEM                                                               744

11/79  SYSTEM                                                               720

12/79  SYSTEM                                                               744

 1/80  SYSTEM                                                               744

 2/80  SYSTEM                                                               696

 3/80  SYSTEM                                                               744

       ** PROBLEMS/SOLUTIONS/COMMENTS

                          NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

 4/80  SYSTEM     100.0        100.0        100.0       100.0                     720   720    720
```

PERFORMANCE DATA											
PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING APRIL AND MAY THE UTILITY EXPERIENCED NO PROBLEMS WITH THE FGD SYSTEM.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
6/80	SYSTEM	100.0	100.0	100.0	4.4			720	32	32	

** PROBLEMS/SOLUTIONS/COMMENTS

THE BOILER WAS SHUTDOWN FROM JUNE 3 TO JUNE 24 FOR ANNUAL MAINTENANCE. THE FGD SYSTEM OPERATED ALONG WITH THE BOILER THE REMAINDER OF THE TIME.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	% REMOVAL PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.

SECTION 15
DESIGN AND PERFORMANCE DATA FOR OPERATIONAL FOREIGN FGD SYSTEMS

COMPANY NAME	ELECTRIC POWER DEVELOPMENT CO	
PLANT NAME	TAKEHARA	
UNIT NUMBER	1	
CITY	MIHARA	
STATE	JAPAN	
GROSS UNIT GENERATING CAPACITY - MW	250.0	
NET UNIT GENERATING CAPACITY W/FGD - MW	231.0	
EQUIVALENT SCRUBBED CAPACITY - MW	250.0	
** FUEL DATA		
FUEL TYPE	COAL	
FUEL GRADE	******	
AVERAGE HEAT CONTENT - J/G	25130.	(10804 BTU/LB)
AVERAGE ASH CONTENT - %	23.00	
AVERAGE MOISTURE CONTENT - %	9.05	
AVERAGE SULFUR CONTENT - %	2.00	
AVERAGE CHLORIDE CONTENT - %	.05	
** FGD SYSTEM		
GENERAL PROCESS TYPE	WET SCRUBBING	
PROCESS TYPE	LIMESTONE	
SYSTEM SUPPLIER	BABCOCK - HITACHI	
NEW/RETROFIT	RETROFIT	
ENERGY CONSUMPTION - %	3.2	
INITIAL START-UP DATE	2/77	
COMMERCIAL START-UP DATE	2/79	
SO2 DESIGN REMOVAL EFFICIENCY - %	94.20	
PARTICULATE DESIGN REMOVAL EFFICIENCY - %	91.70	
ABSORBER SPARE COMPONENTS INDEX	.0	
** WATER LOOP		
TYPE	OPEN	
FRESH MAKE-UP WATER - LITER/S	14.9	(237 GPM)
** BYPRODUCT		
BYPRODUCT NATURE	GYPSUM	
DISPOSITION	MARKETED	

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/79	SYSTEM							720			
5/79	SYSTEM							744			
6/79	SYSTEM							720			
7/79	SYSTEM							744			
8/79	SYSTEM							744			
9/79	SYSTEM							720			
10/79	SYSTEM							744			
11/79	SYSTEM							720			
12/79	SYSTEM							744			
1/80	SYSTEM							744			
2/80	SYSTEM							696			
3/80	SYSTEM							744			

** PROBLEMS/SOLUTIONS/COMMENTS

NO INFORMATION WAS AVAILABLE FOR THE APRIL 1979 THROUGH MARCH 1980 PERIOD.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
4/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

ELECTRIC POWER DEVELOPMENT CO: TAKEHARA 1 (CONT.)

PERFORMANCE DATA

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
5/80	SYSTEM	100.0	100.0	100.0	100.0			744	744	744	
6/80	SYSTEM	100.0	100.0	100.0	100.0			720	720	720	

** PROBLEMS/SOLUTIONS/COMMENTS

DURING THE APRIL, MAY AND JUNE PERIOD THE FGD SYSTEM OPERATED CONTINUOUSLY WITHOUT APPRECIABLE TROUBLE.

PERIOD	MODULE	AVAILABILITY	OPERABILITY	RELIABILITY	UTILIZATION	% REMOVAL SO2	PART.	PER HOURS	BOILER HOURS	FGD HOURS	CAP. FACTOR
7/80	SYSTEM							744			
8/80	SYSTEM							744			
9/80	SYSTEM							720			

** PROBLEMS/SOLUTIONS/COMMENTS

THE THIRD QUARTER UPDATE INFORMATION IS NOT YET AVAILABLE.

APPENDIX A

FGD SYSTEM COST DATA: OPERATIONAL AND NONOPERATIONAL SYSTEMS

INTRODUCTION

The cost of flue gas desulfurization (FGD) systems for the control of sulfur dioxide emissions is an area of intense interest and substantial controversy. As a result, many computer models have recently been developed to estimate capital and annual costs. As part of an effort by the U.S. Environmental Protection Agency to provide meaningful economic data concerning FGD systems, reported economic data have been incorporated into the EPA Utility FGD Survey report. This information has appeared as a separate appendix of the report since October 1976. Until January 1978, this cost appendix consisted entirely of data reported by the utilities with little or no interpretation provided by PEDCo Environmental, Inc. Beginning with the May 1978 report, the format and content of the cost appendix were revised to include reported and adjusted costs for the operational FGD systems.

The rationale for including adjusted as well as reported costs stems primarily from the lack of comparability of the reported costs. Many of the reported cost figures, both capital and operating, are largely site-sensitive values that cannot be accurately compared because they refer to different FGD battery limits and different years in which the expenditures were made. As a result, an analysis of the cost data was made for the operational units since these systems offer the potential of having complete and accurate economic data. The adjustments were made to provide comparable, accurate cost data for the sulfur dioxide portion of the emission control system. This, in effect, will eliminate much of the confusion that exists concerning the reported data, and it will provide a common basis for the reported costs.

In an attempt to promote further comparability of the figures, the adjustment procedure was carried one step further and standardized adjusted figures were developed. This was done by modifying the fixed annual cost rates such that they would be identical for each unit (i.e. cost of depreciation, interim replacement, taxes, insurance and capital costs). The newly adjusted total fixed annual cost rate was applied to the total adjusted capital cost in each case and a standardized adjusted annual cost was obtained.

APPROACH

In March 1978, each utility having at least one operational FGD system was given a cost form containing all available cost information then in the PEDCo files. The utility was asked to verify the data and fill in any missing information called for on the form. A follow-up visit by the PEDCo Environmental staff was arranged to assist in data acquisition and to insure completeness and reliability of information. Results of the cost analysis were forwarded to each participating utility for final review and comment.

The cost data were treated solely to establish the accurate costs for FGD systems, on a common basis, not to critique the design or reasonableness of the costs reported by any utility. Adjustments focused primarily on the following items:

- All capital costs were adjusted to July 1, 1977, dollars using the Chemical Engineering Index. All capital costs, represented in dollars/kilowatt ($/kW), were expressed in terms of gross megawatts (MW). Actual costs were reported by utilities in dollar values for years 1970 to 1980. These values are represented in terms of the year of greatest capital expenditures.

- Gross unit capacity was used to express all FGD capital expenditures because the capital requirement of an FGD system is dependent on actual boiler size before derating for auxiliary and air quality control power requirements.

- Particulate control costs were deducted. Since the purpose of the study was to estimate the incremental cost for sulfur dioxide control, particulate control costs were deducted using either data contained in the cost breakdowns or as a percentage of the total direct cost (capital and annual). The percentage reduction varied depending upon system design and operation.

- The capital costs associated with the modification or installation of equipment not part of the FGD system but needed for its proper functioning, were included (e.g. - stack lining, modification to existing ductwork or fans, etc.).

- Indirect charges were adjusted to provide adequate funds for engineering, field expenses, legal expenses, insurance, interest during construction, allowance for startup, taxes, and contingency.

- All annual costs, represented in mills/kilowatt-hour (mills/kWh), were expressed in terms of net megawatts (MW).

- Net unit capacity was used to express all FGD annual expenditures because the annual cost requirement of an FGD system is dependent on the actual amount of kilowatt-hours (kWh) produced by the unit after derating for auxiliary and air quality control power requirements.

- All annual costs were adjusted to a common capacity factor (65%).

- Replacement power costs were not included since only a few utilities reported such costs and these were presented using a variety of methods.

- Sludge disposal costs were adjusted to reflect the costs of sulfur dioxide waste disposal only (i.e., excluding fly ash disposal) and to provide for disposal over the anticipated lifetime of the FGD system. This latter correction was necessary since several utilities reported costs for sludge disposal capacity that would last only a fraction of the FGD system life. The adjustments were based on a land cost of $2000/acre with a sludge depth of 50 ft in a clay-lined pond (clay is assumed to be available at the site).

- A 30-year life was assumed for all process and economic considerations for all new systems that were installed for the life of the unit. A 20-year life was assumed for all process and economic considerations for retrofit systems that were installed for the remaining portion of the life of the unit.*

- Regeneration and by-product recovery facility costs were added for those regenerable systems not reporting such costs.

To the extent possible, all cost adjustments were made using the previous assumptions developed by PEDCo Environmental. When cost data were inadequate, adjustments were made using process design data in conjunction with the previous cost assumptions. In some cases, no adjustments were possible because of insufficient data.

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* The use of a 30-year service life for new units coincides with the conclusion of the National Power Survey of the Federal Power Commission which recognized this value as reasonable for steam-electric plants. A 20-year service life was assumed for all retrofit units even if the remaining life of the units is less than this value. Thus, two different rates are used and should be noted when making comparisons between new and retrofit systems.

DESCRIPTION OF COST ELEMENTS

Capital costs consist of direct costs, indirect costs, contingency costs, and other capital costs. Direct costs include the "bought-out" cost of the equipment, the cost of installation, and site development. Indirect costs include interest during construction, contractor's fees and expenses, engineering, legal expenses, taxes, insurance, allowance for start-up and shakedown, and spares. Contingency costs include those costs resulting from malfunctions, equipment alterations, and similar unforeseen sources. Other capital costs include the nondepreciable items of land and working capital.

Annual costs consist of direct costs, fixed costs, and overhead costs. Direct costs include the cost of raw materials, utilities, operating labor and supervision, and maintenance and repairs. Fixed costs include those of depreciation, interim replacement, insurance, taxes, and interest on borrowed capital. Overhead costs include those of plant and payroll expenses. The various capital and annual cost components are discussed and defined in greater detail in the following paragraphs.

The direct capital costs include the following elements:

- Equipment required for the FGD system. Table A-1 provides a summary of the major process equipment used in regenerable and nonregenerable systems.

- Installation of equipment, including foundations; steel work for support, buildings, piping and ducting for effluents, slurries, sludge, and make-up water, control panels, instrumentation, insulation of ducting, buildings, piping, and other equipment, painting and piling.

- Site development may include clearing and grading, construction of access roads and walkways, establishment of rail, barge, and/or truck facilities, and parking facilities.

TABLE A-1. MAJOR FGD SYSTEM EQUIPMENT SUMMARY

Category	Description
Material handling-raw materials	Equipment for the handling and transfer of raw materials includes unloading facilities, conveyors, storage areas and silos, vibrators, atmospheric emission control associated with these facilities, and related accessories.
Feed preparation-raw materials	Equipment for the preparation of raw material to produce a feed slurry consists of feed weighers, crushers, grinders, classifiers, ball mills, mixing tanks, pumps, agitators, and related accessories.
Sulfur dioxide absorption	Equipment for treating the flue gas includes absorbers, mist eliminators, hold tanks, agitators, circulating pumps, pond water return pumps, and related accessories.
Flue gas reheat	Equipment required includes air, steam, or hot water heaters, condensate tanks, pumps, soot blowers, fans, fuel storage facilities, gas bypass equipment, and related accessories.
Gas handling	Equipment to handle the boiler flue gas includes booster fans, ductwork, flue gas bypass system, turning vanes, supports, platforms, and related accessories.
Sludge disposal	Nonregenerable FGD systems require solids/water separation equipment such as clarifiers, vacuum filters, centrifuges, sludge fixation equipment, and related accessories.
Utilities	Equipment to supply power and water to the FGD equipment consists of switch-gear, breakers, transformers, piping, and related accessories.
By-product handling	Equipment for processing the by-product of regenerable FGD systems may include a rotary kiln, fluid bed dryer, conveyor, storage silo, vibrator, combustion equipment and oil storage tanks, waste heat boilers, hammer mills, evaporators, crystallizers, strippers, tanks, agitators, pumps, compressors, sulfuric acid absorber and cooling, mist eliminator, pumps, acid coolers, tanks, etc.

(continued)

TABLE A-1. (continued)

Category	Description
Regeneration	Equipment for regeneration of the absorbing medium of an FGD system may consist of reactor vessels, material handling system, storage, weigh feeder, conveyor, rotary kiln, fluid bed calciner, dust collector, storage silo, vibrator, combustion equipment and oil storage tanks, waste heat boiler, hammer mill, evaporators, crystallizers, strippers, tanks, agitators, pumps, compressors, sulfuric acid absorber and cooling, mist eliminator, pumps, acid coolers, tanks, etc.
Purge treatment	Equipment for the removal of purge material (e.g. sodium sulfate) includes refrigeration, pumps, tanks, crystallizer, centrifuge, dryer, dust collector, conveyors, storage, and related equipment.
Auxiliary	Equipment not directly related to the FGD system, but which may require design or modification to accommodate an FGD system may include such items as existing fans, ducts, or stack. If new fans, ducts, or stacks are added to improve boiler performance and accommodate the FGD system, the costs are prorated to the boiler and FGD system.

Indirect capital costs include the following elements:

- Interest accrued on borrowed capital during construction.
- Contractor's fee and expenses, including costs for field labor payroll; field office supervision; personnel; construction offices; temporary roadways; railroad trackage; maintenance and welding shops; parking lot; communications; temporary piping and electrical and sanitary facilities; safety security (fire, material, medical, etc.); construction tools and rental equipment; unloading and storage of materials; travel expenses; permits; licenses; taxes; insurance; overhead; legal liabilities; field testing of equipment; start-up; and labor relations.
- Engineering costs, including administrative, process, project, and general; design and related functions for specifications; bid analysis; special studies; cost analysis; accounting; reports; consultant fees; purchasing; procurement; travel expenses; living expenses; expediting; inspection; safety; communications; modeling; pilot plant studies (if required because of process design or application novelty); royalty payments during construction; training of plant personnel; field engineering; safety engineering; and consultant services.
- Legal expenses, including those for securing permits, rights-of-way, etc.
- Taxes, including sales, and excise taxes.
- Insurance covering liability for equipment in transit and at site; fire, casualty, injury, and death; damage to property; delay; and noncompliance.
- Allowance for start-up and shakedown includes the cost associated with system start-up.
- Spare parts including pumps, valves, controls, special piping and fittings, instruments, spray nozzles, and similar items.

Other capital costs include the following elements:

- Land required for the FGD process, waste disposal, regeneration facility, and storage.
- Working capital, including the total amount of money invested in raw materials and supplies in stock, finished products in stock, and unfinished products

in the process of being manufactured; accounts receivable; cash kept on hand for payment of operating expenses such as salaries, wages, and raw materials purchases; accounts payable; and taxes payable.

Annual cost of an FGD system includes the following direct, fixed and overhead charges:

- Direct Charges
  - Raw materials, including those required by the FGD process for sulfur dioxide control, absorbent regeneration, sludge treatment, sludge fixation, flocculants, etc.
  - Utilities, including water for slurries, cooling and cleaning; electricity for pumps, fans, valves, lighting controls, conveyors, and mixers; fuel for reheating of flue gases; and stream for processing.
  - Operating labor, including supervisory, skilled, and unskilled labor required to operate, monitor, and control the FGD process.
  - Maintenance and repairs, consisting of both manpower and materials to keep the unit operating efficiently. The function of maintenance is both preventive and corrective to keep outages to a minimum.
  - Byproduct Sales: credit from the sale of byproducts regenerable FGD processes (e.g. sulfur, sulfuric acid) is a negative charge deducted from the annual direct cost to obtain the net annual direct cost of the FGD system.
- Fixed Charges
  - Depreciation - the annual charge to recover direct and indirect costs of physical assets over the life of the asset.
  - Interim, replacement - costs expended for temporary or provisional replacement of equipment that has failed or malfunctioned prematurely.
  - Insurance, including the costs of protection from loss by a specified contingency, peril, or unforeseen event. Required coverage could include losses due to fire, personal injury or death, property damage, explosion, lightning, or other natural phenomena.

  - Taxes, including franchise, excise, and property taxes levied by a city, county, state, or Federal government.

  - Interest on borrowed funds.

- Overhead

  Plant and administrative overhead is a business expense that is not charged directly to a particular part of a project, but is allocated to it. Overhead costs include administrative, safety, engineering, legal and medical services; payroll; employee benefits; recreation; and public relations.

Table A-2 provides a summary of the means used to determine the missing cost elements if the costs were not reported or insufficient information prevented their actual determination. The assumptions and cost bases for determining the capital and annual costs of FGD systems were developed by the PEDCo staff based upon previous economic studies conducted for the U.S. EPA (Flue Gas Desulfurization Process Cost Assessment, May 1975; Simplified Procedures for Estimating Flue Gas Desulfurization System Costs, June 1976, EPA-600/2-76-150; Particulate and Sulfur Dioxide Emission Control Costs for Large Coal-Fired Boilers, March 1978, EPA-600/7-78-032).

TABLE A-2. COST ELEMENT FACTORS

Category	Value
Indirect capital costs:	
Interest during construction	10% of total direct capital costs
Field overhead	10% of total direct capital costs
Contractor's fee and expenses	5% of total direct capital costs
Engineering	10% of total direct capital costs
Taxes	2% of total direct capital costs
Spares	1% of total direct capital costs
Shakedown allowance	5% of total direct capital costs
Other capital costs:	
Contingency[a]	20% of total direct and indirect capital costs
Direct annual costs:	
Raw materials:	
Fixation chemicals	\$2/ton
Lime	\$40/ton
Limestone	\$10/ton
Magnesium oxide	\$150/ton
Sodium carbonate	\$80/ton
Salt cake (credit)	\$50/ton
Sulfur (credit)	\$65/ton
Sulfuric acid (credit)	\$25/ton
Utilities:	
Electricity	25 mills/kWh
Water	\$0.20/10^3 gal
Steam	\$0.80/10^6 Btu
Operating labor:	
Direct labor	\$8.50/man-hour
Supervision	15% of direct labor costs

[a] Contingency costs are used only when the cost data supplied are incomplete (such as equipment costs or direct costs only) and a contingency cost must be factored in to give an accurate estimate of the total capital cost.

(continued)

TABLE A-2. (continued)

Category	Value
Maintenance:	
Labor and materials	4% of total direct capital costs
Supplies	15% of labor and materials costs
Overhead:	
Plant	50% of operation and maintenance costs
Payroll	20% of operating labor costs
Fixed annual costs:	
Depreciation	3.33% or 5% (new or retrofit)
Interim replacement[b]	0.7% or 0.35%
Taxes	4%
Insurance	0.3%
Capital costs	9%

[b] Some system components have life spans less than the expected service life of the system. Interim replacement is an allowance factor used in estimating annual revenue requirements to provide for the replacement of these short-lived items. An average allowance of 0.35% of the total investment is normally provided and used for systems with an expected service life of 20 years or less. A higher allowance of 0.70% of the total investment is provided and used for systems with an expected service life of 30 years or more.

DEFINITION OF COST ELEMENTS

The costs displayed in Appendix A are accompanied by a series of alphabetic characters summarizing data presented for each FGD system. These relate to the cost elements described earlier in this section and identify what has been included and excluded for reported and adjusted capital and annual costs. The alphabetic characters, along with their titles, are briefly described in Table A-3.

TABLE A-3. DESCRIPTION OF COST

Code	Title	Description
A	Particulate control (required for FGD process) included in capital cost.	Particulate precollection device (ESP, fabric filter, venturi) prior to FGD system required for proper operation of SO_2 control system.
B	Particulate control (included in FGD process) included in capital cost.	Particulate collection equipment (venturi scrubber) is included in the FGD system.
C	Total direct capital costs included.	Complete cost of all FGD equipment, the labor and materials required for equipment installation, and interconnecting the system is included in the total capital cost.
D	Partial direct capital costs included.	One or a number of direct cost items, or the cost associated with one or a number of direct cost items, are excluded from the total capital cost.
E	Total indirect capital costs included.	Complete cost of all the indirect cost elements, including interest during construction, contractor's fees, engineering, legal expenses, taxes, insurance, allowance for start-up, and spares, is included in total capital cost.
F	Partial indirect costs included.	One or a number of indirect cost items, or the cost associated with one or a number of indirect cost items, are excluded from the total capital cost.
G	Chemical fixation of sludge included in capital cost.	The cost of a chemical fixation process which stabilizes the flue gas cleaning wastes prior to disposal is included in the total capital cost.
H	Dry sludge disposal included in capital cost.	The cost of a secondary dewatering or treatment method, such as filtration, centrifugation, or forced oxidation, which ultimately produces a dry sludge cake for final disposal, is included in the total capital cost.
I	Off-site landfill area included in capital cost.	The cost of an off-site area used as a landfill for flue gas cleaning wastes is included in the total capital cost.
J	Sludge pond included in capital cost.	The cost of an on-site disposal area for ponding of treated or untreated flue gas cleaning wastes is included in the total capital cost.
K	Additional sludge disposal capacity added for life of system.	The cost of additional SO_2 waste disposal capacity required for FGD system operation over the anticipated service life of the unit is included in the total capital cost.
L	Stack included in capital cost.	The cost of the stack is included in the total capital cost.
M	Modifications to stack, ducts, and/or fans included in capital cost.	Modifications to existing equipment (stack, fans, ducts, etc.) which are required because of inclusion of an FGD system.
N	Total regeneration facility cost included in capital cost.	Complete cost of entire regeneration facility included in total capital cost.
O	Partial regeneration facility cost included in capital cost.	Part of the cost associated with the regeneration facility included in the total capital cost.
P	R & D costs included in capital cost.	Bench scale or pilot plant studies to determine process and design characteristics.

(continued)

TABLE A-3. (continued)

Code	Title	Description
Q	Costs underwritten by system supplier included in capital cost.	Capital expenditures underwritten by the system supplier for system repairs or modifications for optimization of performance or R & D programs.
R	Excess reagent supply costs included in capital cost.	Capital expenditures for reagent supply exceeds the amount required for the period of initial operation.
S	Total direct annual costs included.	Complete cost of all raw materials, utilities, operating labor and maintenance and repairs is included in the total annual cost.
T	Partial direct annual costs included.	One or a number of direct annual cost items, or the cost associated with one or a number of direct annual cost items, are excluded from the total annual cost.
U	Total fixed annual costs included.	Complete cost of all fixed cost elements, including depreciation, interim replacement, insurance, taxes, and interest, is included in the total annual cost.
V	Partial fixed annual costs included.	One or a number of fixed annual cost items, or the cost associated with one or a number of fixed annual cost items, are excluded from the total annual cost.
W	Overhead cost included in total annual cost.	Plant and payroll overhead costs are included in the total annual cost.
X	Particulate control costs included in direct annual cost.	The cost of operating particulate collection equipment included in the FGD system is included in the total annual cost.
Y	Sludge disposal service costs (contract) included in direct annual cost.	The treatment and disposal of flue gas cleaning wastes that are handled by an outside firm.
Z	Replacement energy costs included in total annual costs.	The cost of additional power-generating capacity required to compensate for power used by the FGD system.

RESULTS OF COST ANALYSIS

The results of the operational FGD system survey are summarized in Table A-4 and Section A-1. Table A-4 produces a summary of a categorical analysis of the reported and adjusted capital and annual costs for the operational FGD systems addressed in the survey. Included in this categorical analysis are the ranges, means, and standard deviation for all the various types and categories of FGD systems examined. Section A-1 summarizes the reported and adjusted capital and annual costs for all the operational FGD systems that were addressed in the cost study (Section A-2 summarizes available cost data for nonoperational FGD systems).

TABLE A-4. CATEGORICAL RESULTS OF THE REPORTED AND ADJUSTED/ CAPITAL AND ANNUAL COSTS FOR OPERATIONAL FGD SYSTEMS

CATEGORY	REPORTED						ADJUSTED					
	CAPITAL, $/KW			ANNUAL, MILLS/KWH			CAPITAL, $/KW			ANNUAL, MILLS/KWH		
	RANGE	AVG	DEV	RANGE	AVG	DEV	RANGE	AVG	DEV	RANGE	AVG	DEV
ALL	29.2-189.0	79.7	38.6	.1- 14.9	4.4	4.4	56.0-140.6	88.0	23.4	2.6- 12.4	5.4	2.4
NEW	31.8-189.0	79.5	38.7	.1- 14.3	3.2	3.9	66.4-117.6	86.1	17.8	2.8- 8.7	5.2	2.0
RETROFIT	29.2-156.9	80.1	38.5	2.1- 14.9	6.5	4.5	56.0-140.6	90.0	20.1	2.6- 12.4	5.6	2.7
THROWAWAY PRODUCT	29.2-189.0	76.2	36.8	.1- 14.3	4.1	4.8	56.0-140.6	86.2	21.9	2.6- 8.7	5.1	2.0
SALEABLE PRODUCT	127.9-156.9	137.6	13.7	14.9- 14.9	14.9	.0	134.8-134.8	134.8	.0	12.4- 12.4	12.4	.0
LIMESTONE	31.8-168.0	75.7	37.0	.9- 3.3	2.0	.7	56.0-117.6	88.6	25.5	2.6- 6.6	4.6	1.6
LIME	29.2-128.3	74.9	32.2	.1- 14.3	6.9	4.8	67.5-140.6	90.8	22.2	2.7- 8.7	6.4	2.0
DUAL ALKALI	43.2-189.0	96.7	65.5	3.2- 3.2	3.2	.0	*****- .0	.0	.0	*****- .0	.0	.0
LIME/ALKALINE FLYASH	77.1- 85.9	80.0	4.1	.3- .3	.3	.0	77.2- 93.0	82.5	7.4	4.1- 5.2	4.5	.5
SODIUM CARBONATE	42.9-120.0	79.8	37.0	2.1- 2.1	2.1	.0	60.9-107.9	76.6	22.2	3.2- 4.4	3.6	.6
WELLMAN LORD	127.9-156.9	137.6	13.7	14.9- 14.9	14.9	.0	134.8-134.8	134.8	.0	12.4- 12.4	12.4	.0
LIMESTONE/ALKALINE FLYASH	47.9- 47.9	47.9	.0	2.0- 2.0	2.0	.0	71.2- 71.2	71.2	.0	2.8- 2.8	2.8	.0

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST		
		REPORTED	ADJUSTED	STANDARDIZED ADJUSTED
ALABAMA ELECTRIC COOP	CAPACITY FACTOR, %	***	65	65
TOMBIGBEE	TOTAL CAPITAL, $/KW(YEAR)	69.5(1978)	******(0)	******(0)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
179.0 MW (NET)	COST ELEMENTS	C,E,J		
ARIZONA ELECTRIC POWER COOP	CAPACITY FACTOR, %	44	65	65
APACHE	TOTAL CAPITAL, $/KW(YEAR)	35.9(1977)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1978)	******(0)	******(0)
96.0 MW (NET)	COST ELEMENTS	C,E,H,J,L,S, U,W,Y,Z		
ARIZONA ELECTRIC POWER COOP	CAPACITY FACTOR, %	44	65	65
APACHE	TOTAL CAPITAL, $/KW(YEAR)	31.8(1977)	******(0)	******(0)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1978)	******(0)	******(0)
96.0 MW (NET)	COST ELEMENTS	C,E,H,J,L,S, U,W,Y,Z		
ARIZONA PUBLIC SERVICE	CAPACITY FACTOR, %	85	65	65
CHOLLA	TOTAL CAPITAL, $/KW(YEAR)	52.0(1973)	56.0(1977)	56.0(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.2(1976)	2.6(1977)	2.3(1977)
119.0 MW (NET)	COST ELEMENTS	B,C,E,S,U,X	C,E,K,S,U,W	C,E,K,S,U,W
ARIZONA PUBLIC SERVICE	CAPACITY FACTOR, %	65	65	65
CHOLLA	TOTAL CAPITAL, $/KW(YEAR)	168.0(1978)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.5(1978)	******(0)	******(0)
264.0 MW (NET)	COST ELEMENTS	B,D,T,X		
BASIN ELECTRIC POWER COOP	CAPACITY FACTOR, %	***	65	65
LARAMIE RIVER	TOTAL CAPITAL, $/KW(YEAR)	56.0(1980)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	.9(7800)	******(0)	******(0)
570.0 MW (NET)	COST ELEMENTS	C,E		
BIG RIVERS ELECTRIC	CAPACITY FACTOR, %	***	65	65
GREEN	TOTAL CAPITAL, $/KW(YEAR)	43.2(1976)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
242.0 MW (NET)	COST ELEMENTS	B,C		
CENTRAL ILLINOIS LIGHT	CAPACITY FACTOR, %	***	65	65
DUCK CREEK	TOTAL CAPITAL, $/KW(YEAR)	93.3(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.3(1976)	******(0)	******(0)
416.0 MW (NET)	COST ELEMENTS	C,E,J,M		
CENTRAL ILLINOIS PUBLIC SERV	CAPACITY FACTOR, %	***	65	65
NEWTON	TOTAL CAPITAL, $/KW(YEAR)	189.0(1979)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
617.0 MW (NET)	COST ELEMENTS	C,E,G		

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	 ADJUSTED	 STANDARDIZED ADJUSTED
COLORADO UTE ELECTRIC ASSN	CAPACITY FACTOR, %	***	65	65
CRAIG	TOTAL CAPITAL, $/KW(YEAR)	73.7(1979)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
400.0 MW (NET)	COST ELEMENTS	A,C		
COLUMBUS & SOUTHERN OHIO ELEC	CAPACITY FACTOR, %	48	65	65
CONESVILLE	TOTAL CAPITAL, $/KW(YEAR)	55.5(1975)	70.7(1977)	70.7(1977)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	5.8(1978)	7.4(1977)	7.4(1977)
411.0 MW (NET)	COST ELEMENTS	B,C,J,M,S,U, W,X,Y	C,E,J,M,S,U, W,Y	C,E,J,M,S,U, W,Y
COLUMBUS & SOUTHERN OHIO ELEC	CAPACITY FACTOR, %	48	65	65
CONESVILLE	TOTAL CAPITAL, $/KW(YEAR)	55.5(1978)	70.7(1977)	******(0)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	5.8(1978)	******(0)	******(0)
411.0 MW (NET)	COST ELEMENTS	B,C,J,M,S,U, W,X,Y	C,E,J,M,S,U, W,Y	
COMMONWEALTH EDISON	CAPACITY FACTOR, %	***	65	65
POWERTON	TOTAL CAPITAL, $/KW(YEAR)	125.0(1979)	******(0)	******(0)
51	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
450.0 MW (NET)	COST ELEMENTS	C,E,H,J		
DUQUESNE LIGHT	CAPACITY FACTOR, %	64	65	65
ELRAMA	TOTAL CAPITAL, $/KW(YEAR)	113.4(1976)	127.1(1977)	127.1(1977)
1-4	TOTAL ANNUAL, MILLS/KWH(YEAR)	8.6(1977)	7.8(1977)	7.5(1977)
510.0 MW (NET)	COST ELEMENTS	B,D,F,I,J,M, T,V,X,Y	C,E,I,J,M,S, U,Y	C,E,I,J,M,S, U,Y
DUQUESNE LIGHT	CAPACITY FACTOR, %	70	65	65
PHILLIPS	TOTAL CAPITAL, $/KW(YEAR)	106.9(1972)	140.6(1977)	140.6(1977)
1-6	TOTAL ANNUAL, MILLS/KWH(YEAR)	7.8(1977)	8.6(1977)	8.2(1977)
408.0 MW (NET)	COST ELEMENTS	B,D,F,I,J,M, T,V,X,Y	C,E,I,J,M,S, U,Y	C,E,I,J,M,S, U,Y
INDIANAPOLIS POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
PETERSBURG	TOTAL CAPITAL, $/KW(YEAR)	99.5(1976)	110.6(1977)	110.6(1977)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	6.6(1977)	7.4(1977)
532.0 MW (NET)	COST ELEMENTS	C,F,G,J,M	C,E,G,J,M,S, U,W,Y	C,E,G,J,M,S, U,W,Y
KANSAS CITY POWER & LIGHT	CAPACITY FACTOR, %	14	65	65
HAWTHORN	TOTAL CAPITAL, $/KW(YEAR)	29.2(1972)	87.2(1977)	87.2(1977)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	8.4(1977)	4.3(1977)	4.4(1977)
90.0 MW (NET)	COST ELEMENTS	B,D,F,T,X	B,C,E,J,K,S, U,W,X	B,C,E,J,K,S, U,W,X
KANSAS CITY POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
HAWTHORN	TOTAL CAPITAL, $/KW(YEAR)	29.2(1972)	87.2(1977)	87.2(1977)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	8.4(1977)	4.3(1977)	4.4(1977)
90.0 MW (NET)	COST ELEMENTS	B,D,F,T,X	B,C,E,J,K,S, U,W,X	B,C,E,J,K,S, U,W,X

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	 ADJUSTED	 STANDARDIZED ADJUSTED
KANSAS CITY POWER & LIGHT	CAPACITY FACTOR, %	42	65	65
LA CYGNE	TOTAL CAPITAL, $/KW(YEAR)	53.6(1972)	68.0(1977)	68.0(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.3(1978)	3.8(1977)	3.9(1977)
820.0 MW (NET)	COST ELEMENTS	T	C,E,J,K,S,U	C,E,J,K,S,U
KANSAS POWER & LIGHT	CAPACITY FACTOR, %	***	65	65
JEFFREY	TOTAL CAPITAL, $/KW(YEAR)	56.8(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(1978)	******(0)	******(0)
540.0 MW (NET)	COST ELEMENTS	B,C		
KENTUCKY UTILITIES	CAPACITY FACTOR, %	16	65	65
GREEN RIVER	TOTAL CAPITAL, $/KW(YEAR)	70.3(1975)	77.5(1977)	77.5(1977)
1-3	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.3(1977)	2.7(1977)	5.2(1977)
64.0 MW (NET)	COST ELEMENTS	B,C,E,J,S,U,W	C,E,J,S,U,W	C,E,J,S,U,W
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	55	65	65
CANE RUN	TOTAL CAPITAL, $/KW(YEAR)	66.5(1975)	80.6(1977)	80.6(1977)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.7(1977)	5.8(1977)	6.2(1977)
188.0 MW (NET)	COST ELEMENTS	C,E,H,J,Q,T	C,E,H,J,K,Q,S,U,W	C,E,H,J,K,Q,S,U,W
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	***	65	65
CANE RUN	TOTAL CAPITAL, $/KW(YEAR)	62.4(1977)	67.5(1977)	67.5(1977)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	5.6(1977)	5.6(1977)
200.0 MW (NET)	COST ELEMENTS	C,E,H,J	C,E,H,J,K,S,U,W	C,E,H,J,K,S,U,W
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	***	65	65
CANE RUN	TOTAL CAPITAL, $/KW(YEAR)	57.9(1977)	******(0)	******(0)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.2(1979)	******(0)	******(0)
299.0 MW (NET)	COST ELEMENTS	C,E,H,M,S,V,W		
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	10	65	65
MILL CREEK	TOTAL CAPITAL, $/KW(YEAR)	42.6(1978)	******(0)	******(0)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.3(1978)	******(0)	******(0)
442.0 MW (NET)	COST ELEMENTS	C,S		
LOUISVILLE GAS & ELECTRIC	CAPACITY FACTOR, %	***	65	65
PADDY'S RUN	TOTAL CAPITAL, $/KW(YEAR)	52.8(1973)	76.4(1977)	76.4(1977)
5	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	6.5(1977)	6.4(1977)
72.0 MW (NET)	COST ELEMENTS	C,E	C,E,S,U,W	C.E.S.U.W
MINNKOTA POWER COOPERATIVE	CAPACITY FACTOR, %	***	65	65
MILTON R. YOUNG	TOTAL CAPITAL, $/KW(YEAR)	85.0(1976)	93.0(1977)	93.0(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	5.2(1977)	5.2(1977)
185.0 MW (NET)	COST ELEMENTS	C,E,H,P	C,E,H,M,P,S,U,W	C.E.H.M.P.S.U.W

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST: REPORTED	COST: ADJUSTED	COST: STANDARDIZED ADJUSTED
MONONGAHELA POWER	CAPACITY FACTOR, %	65	65	65
PLEASANTS	TOTAL CAPITAL, $/KW(YEAR)	128.3(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.8(1978)	******(0)	******(0)
618.0 MW (NET)	COST ELEMENTS	B,C,J,S		
MONTANA POWER	CAPACITY FACTOR, %	76	65	65
COLSTRIP	TOTAL CAPITAL, $/KW(YEAR)	77.1(1975)	77.2(1977)	77.2(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	.3(1977)	4.1(1977)	4.1(1977)
360.0 MW (NET)	COST ELEMENTS	B,C,E,J,P,T	C,E,J,K,P,S, U,W	C,E,J,K,P,S, U,W
MONTANA POWER	CAPACITY FACTOR, %	76	65	65
COLSTRIP	TOTAL CAPITAL, $/KW(YEAR)	77.1(1975)	77.2(1977)	77.2(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	.3(1977)	4.1(1977)	4.1(1977)
360.0 MW (NET)	COST ELEMENTS	B,C,F,J,P,T	C,E,J,K,P,S, U,W	C,E,J,K,P,S, U,W
NEVADA POWER	CAPACITY FACTOR, %	67	65	65
REID GARDNER	TOTAL CAPITAL, $/KW(YEAR)	42.9(1973)	60.9(1977)	60.9(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1977)	3.2(1977)	3.4(1977)
125.0 MW (NET)	COST ELEMENTS	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X
NEVADA POWER	CAPACITY FACTOR, %	67	65	65
REID GARDNER	TOTAL CAPITAL, $/KW(YEAR)	42.9(1973)	60.9(1977)	60.9(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1977)	3.2(1977)	3.4(1977)
125.0 MW (NET)	COST ELEMENTS	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X	B,D,E,P,S,U, W,X
NEVADA POWER	CAPACITY FACTOR, %	67	65	65
REID GARDNER	TOTAL CAPITAL, $/KW(YEAR)	113.6(1975)	107.9(1977)	107.9(1977)
3	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.1(1977)	4.4(1977)	5.0(1977)
125.0 MW (NET)	COST ELEMENTS	B,C,E,L,S,U, W,X	B,C,E,L,S,U, W,X	B,C,E,L,S,U, W,X
NORTHERN INDIANA PUB SERVICE	CAPACITY FACTOR, %	77	65	65
DEAN H. MITCHELL	TOTAL CAPITAL, $/KW(YEAR)	156.9(1976)	134.8(1977)	134.8(1977)
11	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.9(1976)	12.4(1977)	11.0(1977)
115.0 MW (NET)	COST ELEMENTS	B,C,E,L,N,S, U,W,X,Z	C,E,L,N,S,U, W,Z	C,E,L,N,S,U, W,Z
NORTHERN STATES POWER	CAPACITY FACTOR, %	73	65	65
SHERBURNE	TOTAL CAPITAL, $/KW(YEAR)	47.8(1972)	71.2(1977)	71.2(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.0(1977)	2.8(1977)	3.3(1977)
740.0 MW (NET)	COST ELEMENTS	B,C,J,S,U,X, Z	C,E,J,K,S,U, W	C,E,J,K,S,U, W
NORTHERN STATES POWER	CAPACITY FACTOR, %	73	65	65
SHERBURNE	TOTAL CAPITAL, $/KW(YEAR)	47.8(1972)	71.2(1977)	71.2(1977)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.0(1977)	2.8(1977)	3.3(1977)
740.0 MW (NET)	COST ELEMENTS	B,C,J,S,U,X, Z	C,E,J,K,S,U, W	C,E,J,K,S,U, W

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	COST ADJUSTED	COST STANDARDIZED ADJUSTED
PACIFIC POWER & LIGHT JIM BRIDGER 4 550.0 MW (NET)	CAPACITY FACTOR, %	***	65	65
	TOTAL CAPITAL, $/KW(YEAR)	120.0(1979)	******(0)	******(0)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
	COST ELEMENTS	C,F,J		
PENNSYLVANIA POWER BRUCE MANSFIELD 1 917.0 MW (NET)	CAPACITY FACTOR, %	40	65	65
	TOTAL CAPITAL, $/KW(YEAR)	120.6(1975)	102.1(1977)	102.1(1977)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.3(1977)	9.7(1977)	10.8(1977)
	COST ELEMENTS	B,C,E,G,I,L,S,U,W,X	C,E,G,I,M,S,U,W	C,E,G,I,M,S,U,W
PENNSYLVANIA POWER BRUCE MANSFIELD 2 917.0 MW (NET)	CAPACITY FACTOR, %	40	65	65
	TOTAL CAPITAL, $/KW(YEAR)	120.6(1975)	102.1(1977)	102.1(1977)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	14.3(1977)	9.7(1977)	10.8(1977)
	COST ELEMENTS	B,C,E,G,I,L,S,U,W,X	C,E,G,I,M,S,U,W	C,E,G,I,M,S,U,W
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 1 361.0 MW (NET)	CAPACITY FACTOR, %	***	65	65
	TOTAL CAPITAL, $/KW(YEAR)	127.9(1977)	******(0)	******(0)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
	COST ELEMENTS	A,C,E,N		
PUBLIC SERVICE OF NEW MEXICO SAN JUAN 2 550.0 MW (NET)	CAPACITY FACTOR, %	***	65	65
	TOTAL CAPITAL, $/KW(YEAR)	127.8(1977)	******(0)	******(0)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
	COST ELEMENTS	A,C,E,N		
SALT RIVER PROJECT CORONADO 1 280.0 MW (NET)	CAPACITY FACTOR, %	***	65	65
	TOTAL CAPITAL, $/KW(YEAR)	74.0(1978)	******(0)	******(0)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
	COST ELEMENTS	C,E		
SALT RIVER PROJECT CORONADO 2 280.0 MW (NET)	CAPACITY FACTOR, %	***	65	65
	TOTAL CAPITAL, $/KW(YEAR)	74.0(1978)	******(0)	******(0)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
	COST ELEMENTS	C,E		
SOUTH CAROLINA PUBLIC SERVICE WINYAH 2 140.0 MW (NET)	CAPACITY FACTOR, %	80	65	65
	TOTAL CAPITAL, $/KW(YEAR)	47.4(1976)	66.4(1977)	66.4(1977)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.6(1975)	2.9(1977)	3.2(1977)
	COST ELEMENTS	C,F,J,M,S,V	C,E,J,K,M,S,U,W	C,E,J,K,M,S,U,W
SOUTH MISSISSIPPI ELEC PWR R.D. MORROW, SR. 1 124.0 MW (NET)	CAPACITY FACTOR, %	***	65	65
	TOTAL CAPITAL, $/KW(YEAR)	37.4(1975)	******(0)	******(0)
	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
	COST ELEMENTS	C,E		

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-1
COSTS FOR OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST REPORTED	 ADJUSTED	 STANDARDIZED ADJUSTED
SOUTH MISSISSIPPI ELEC PWR	CAPACITY FACTOR, %	***	65	65
R.D. MORROW, SR.	TOTAL CAPITAL, $/KW(YEAR)	37.6(1975)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
124.0 MW (NET)	COST ELEMENTS	C,F		
SOUTHERN ILLINOIS POWER COOP	CAPACITY FACTOR, %	65	65	65
MARION	TOTAL CAPITAL, $/KW(YEAR)	152.7(1978)	******(0)	******(0)
4	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.8(1978)	******(0)	******(0)
173.0 MW (NET)	COST ELEMENTS	B,C,T,X		
SOUTHERN INDIANA GAS & ELEC	CAPACITY FACTOR, %	***	65	65
A.B. BROWN	TOTAL CAPITAL, $/KW(YEAR)	63.2(1979)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
265.0 MW (NET)	COST ELEMENTS	C,E,G		
SPRINGFIELD CITY UTILITIES	CAPACITY FACTOR, %	***	65	65
SOUTHWEST	TOTAL CAPITAL, $/KW(YEAR)	77.3(1974)	117.6(1977)	117.6(1977)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	6.2(1977)	6.9(1977)
194.0 MW (NET)	COST ELEMENTS	C,F,H,J,P	C,E,H,J,K,P,S,U,W	C,E,H,J,K,P,S,U,W
TENNESSEE VALLEY AUTHORITY	CAPACITY FACTOR, %	60	65	65
WIDOWS CREEK	TOTAL CAPITAL, $/KW(YEAR)	98.1(1976)	113.1(1977)	113.1(1977)
8	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.0(1977)	5.3(1977)	5.1(1977)
550.0 MW (NET)	COST ELEMENTS	B,C,E,P,R,T,U	C,E,J,S,U,W	C,E,J,S,U,W
UTAH POWER & LIGHT	CAPACITY FACTOR, %	65	65	65
HUNTER	TOTAL CAPITAL, $/KW(YEAR)	91.1(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	.1(1978)	******(0)	******(0)
360.0 MW (NET)	COST ELEMENTS	B,C,T,X		
UTAH POWER & LIGHT	CAPACITY FACTOR, %	80	65	65
HUNTINGTON	TOTAL CAPITAL, $/KW(YEAR)	85.9(1978)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	1.4(1978)	******(0)	******(0)
366.0 MW (NET)	COST ELEMENTS	B,C,T,X		

****** INDICATES COST FIGURES NOT YET AVAILABLE

SECTION A-2
COSTS FOR NON-OPERATIONAL FGD SYSTEMS

UNIT DESCRIPTION	COST DESCRIPTION	COST		
		REPORTED	ADJUSTED	STANDARDIZED ADJUSTED
BASIN ELECTRIC POWER COOP	CAPACITY FACTOR, %	***	65	65
LARAMIE RIVER	TOTAL CAPITAL, $/KW(YEAR)	56.0(1980)	******(0)	******(0)
2	TOTAL ANNUAL, MILLS/KWH(YEAR)	.9(78 00)	******(0)	******(0)
570.0 MW (NET)	COST ELEMENTS	C,E		
BOSTON EDISON	CAPACITY FACTOR, %	***	65	65
MYSTIC	TOTAL CAPITAL, $/KW(YEAR)	63.4(1972)	******(0)	******(0)
6	TOTAL ANNUAL, MILLS/KWH(YEAR)	3.0(1974)	******(0)	******(0)
150.0 MW (NET)	COST ELEMENTS	B,C,E,N,Q		
COLORADO UTE ELECTRIC ASSN	CAPACITY FACTOR, %	***	65	65
CRAIG	TOTAL CAPITAL, $/KW(YEAR)	86.5(1979)	******(0)	******(0)
1	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
447.0 MW (NET)	COST ELEMENTS	B,D,E		
ILLINOIS POWER COMPANY	CAPACITY FACTOR, %	***	65	65
WOOD RIVER	TOTAL CAPITAL, $/KW(YEAR)	82.5(1972)	******(0)	******(0)
6	TOTAL ANNUAL, MILLS/KWH(YEAR)	******(0)	******(0)	******(0)
110.0 MW (NET)	COST ELEMENTS	A,C,E,M,N		
PHILADELPHIA ELECTRIC	CAPACITY FACTOR, %	***	65	65
EDDYSTONE	TOTAL CAPITAL, $/KW(YEAR)	156.7(1972)	233.2(1977)	233.2(1977)
1A	TOTAL ANNUAL, MILLS/KWH(YEAR)	2.0(1972)	13.0(1977)	12.4(1977)
120.0 MW (NET)	COST ELEMENTS	D,F,N,P	C,E,N,P	C,E,N,P

****** INDICATES COST FIGURES NOT YET AVAILABLE

APPENDIX B

DEFINITIONS

DEFINITIONS

Boiler Commercial Service Date	Date when boiler and auxiliary equipment (including FGD system for new boilers) has met initial supplier guarantees and begins to contribute electrical power to the power grid.
Byproduct	The nature (e.g. elemental sulfur, sulfuric acid) and disposition (e.g. stockpile on site, marketed) of the end product by systems that generate a saleable product.
Commercial Service Date (FGD System)	Date when the FGD system successfully completes compliance testing and the utility is satisfied that the system meets supplier contractual guarantees.
Company Name	Name of corporation as it appears in Electrical World - Directory of Electrical Utilities, McGraw-Hill - Current Edition - as space permits.
Disposal	Disposal method for throwaway product systems producing sludge including: stabilized or unstabilized sludge, interim and final disposal sites and disposal type (minefill, landfill, etc.) as well as disposal location.
Efficiency:	
Particulate Matter	The actual percentage of particulate matter removed by the emission control system (mechanical collectors, ESP, or fabric filter and FGD) from the untreated flue gas.
SO_2	The actual percentage of SO_2 removed from the flue gas by the FGD system.

FGD Viability Indexes	Several parameters have been developed to quantify the viability of FGD system technology. Various terms such as "availability," "reliability," "operability," and "utilization" are used to accurately represent the operation of any FGD system during a given period. The above-mentioned parameters are defined below and discussed briefly. The objectives of this discussion are to make the reader aware that several different definitions are being used and to select appropriate parameters that can be used for reporting purposes so that reasonably consistent comparisons can be made.
Availability Index	Hours the FGD system is available for operation (whether operated or not) divided by hours in period, expressed as a percentage. This parameter tends to overestimate the viability of the FGD system because it does not penalize for election not to operate the system when it could have been operated. Boiler downtime may tend to increase the magnitude of the parameter because FGD failures generally cannot occur during such periods.
Reliability Index	Hours the FGD system was operated divided by the hours the FGD system was called upon to operate, expressed as a percentage. This parameter has been developed in order not to penalize the FGD system for elected outages, e.g., periods when the FGD system could have been run but was not run because of chemical shortages, lack of manpower, short duration boiler operations, etc. The main problem in using this

	formula is the concise determination whether or not the system was "called upon to operate" during a given time period. In addition, an undefined value can result when the FGD system is not called upon to operate for a given period (e.g., turbine or boiler outage when FGD system is available).
FGD Operability Index	Hours the FGD system was operated divided by boiler operating hours in period, expressed as a percentage. This parameter indicates the degree to which the FGD system is actually used, relative to boiler operating time. The parameter is penalized when options are exercised not to use the FGD system in periods when the system is operable. In addition, an undefined value can result when the FGD system is not called upon to operate for a given period (e.g., turbine or boiler outage when FGD system is available).
FGD Utilization Index	Hours that the FGD system operated divided by total hours in period. This parameter is a relative stress factor for the FGD system. It is not a complete measure of FGD system viability because the parameter can be strongly influenced by conditions that are external to the FGD system (e.g., infrequent boiler operation will lower the value of the parameter although the FGD system may be highly dependable in its particular application).
End Product	
Saleable	The SO_2 removed from the flue gas is recovered in a usable or marketable form (e.g., sulfur, sulfuric acid, gypsum,

	ammonium sulfate, sodium sulfate).
Throwaway	The SO_2 removed from the flue gas is not recovered in a usable or marketable form and resulting sulfur-bearing waste products must be disposed in an environmentally acceptable fashion.
Energy Consumption, %	The percentage of gross unit electrical generating capacity consumed by the FGD system, as defined by the following equation: [Net MW w/o FGD - Net MW w/FGD]/ Gross unit rating]
Equivalent Scrubbed Capacity (ESC)	The effective scrubbed flue gas in equivalent MW based on the percent of flue gas scrubbed by the FGD system.
FGD Status:	
Category 1	Operational - FGD system is in service removing SO_2.
Category 2	Under construction - ground has been broken for installation of FGD system, but FGD system has not become operational.
Category 3	Planned, Contract Awarded - contract has been signed for purchase of FGD system but ground has not been broken for installation.
Cateogry 4	Planned, Letter of Intent Signed - letter of intent has been signed, but legal contract for purchase has not been awarded.
Category 5	Planned, Requesting/Evaluating Bids - bid requests have been released but no letter of intent or contract has been issued.

Category 6	Considering only FGD Systems - an FGD system is proposed as a means to meet an SO_2 regulation.
Category 7	Considering an FGD system as well as alternative methods.
Category 8	Nonoperational - FGD system has been operated in the past but has been shut down permanently or for an extended indefinite period of time.
Fuel Firing Rate - TPH	Boiler fuel firing rate in terms of tons per hour at maximum continuous load.
General Process Type	The manner in which the SO_2 from the flue gas is collected, e.g., wet scrubbing, spray drying, dry adsorption.
Initial Start-Up (FGD System)	Date when flue gas first passes through any component of the FGD system (or is scheduled to do so).
New	FGD unit and boiler were designed at the same time or space for addition of an FGD unit was reserved when boiler was constructed.
Plant Name	Unit identification as it appears in Electrical World - Directory of Electrical Utilities, McGraw-Hill - Current Edition - or as indicated by utility representative for installations in planning stages.
Process Additives	A chemical compound or element which is added to the process or normally found with the main process reagent in small quantities (e.g., Mg, adipic acid) to promote improved process operation (e.g., scale reduction, increased SO_2 removal efficiency).

Process Type	Company name if process is patented. Generic name if several companies have similar processes (e.g., Lime, Limestone, Wellman Lord, Thoroughbred 121).
Regulatory Class	A. New boiler constructed subject to Federal New Source Performance Standards (NSPS), 8/17/71. B. Existing boiler subject to State Standard that is more stringent than the NSPS, 8/17/71. C. Existing boiler subject to State Standard that is equal to or less stringent than NSPS, 8/17/71. D. Other (unknown, undetermined).
Retrofit	FGD unit will be/was added to an existing boiler not specifically designed to accommodate FGD unit.
Spare Capacity Index - %	The summation of the individual component capacities (%) minus 100%.
Spare Component Index	The equipment spare capacity index (%) divided by the individual component capacity (%).
System Supplier	A firm that fabricates and supplies flue gas desulfurization systems.
Total Controlled Capacity (TCC)	The gross rating (MW) of a unit brought into compliance with FGD, regardless of the percent of flue gas treated at the facility. In the case of prototype and demonstration FGD systems, this figure will be identical to the Equivalent Scrubbed Capacity rather than

	the gross unit rating if the system is not meant to bring the facility into compliance with SO_2 emission standards.
Unit Rating	
Gross	Operational - Maximum continuous gross generation capacity in MW; Preoperational - maximum continuous design generation capacity in MW.
New w/FGD	Gross unit rating less the energy required to operate ancillary station equipment, inclusive of emission control systems.
Net w/o FGD	Gross unit rating less the energy required to operate ancillary station equipment, exclusive of emission control systems.

APPENDIX C

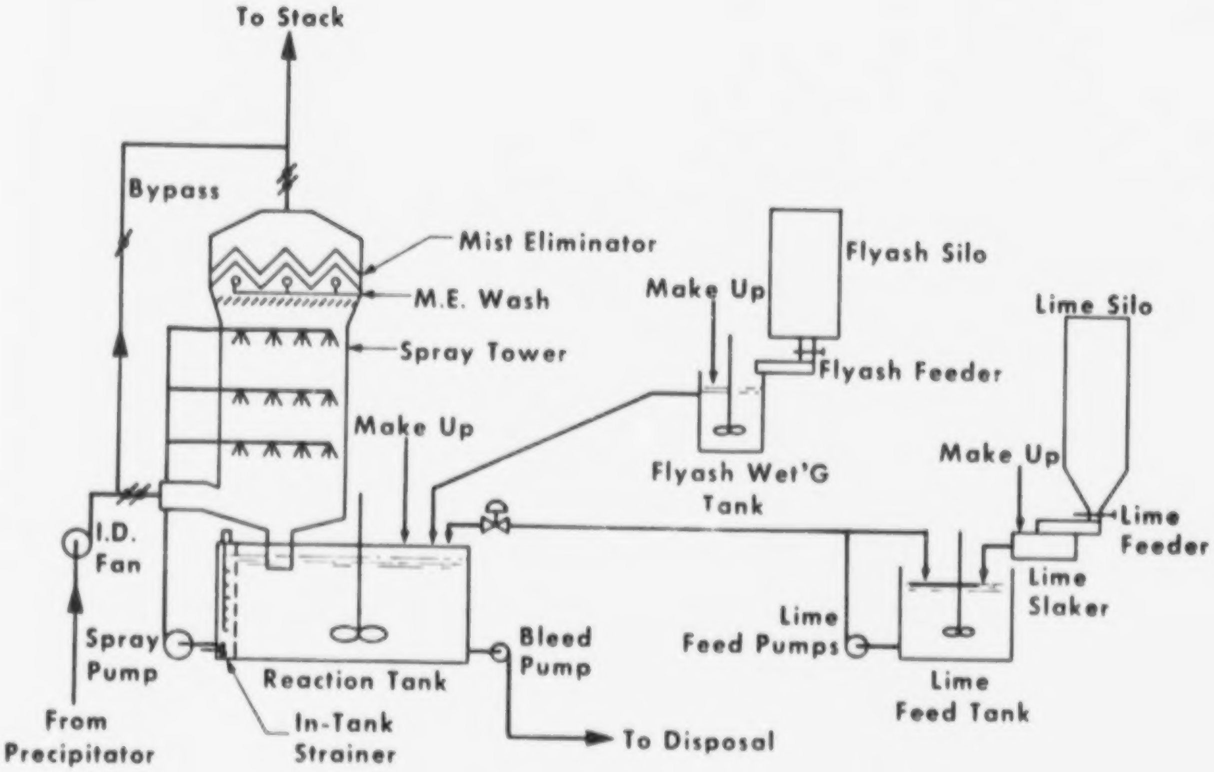
TABLE OF UNIT NOTATION

TABLE OF UNIT NOTATION

Classification	English Unit	Symbol	Survey Report Notation	ASTM/SI Unit	Symbol	Survey Report Notation
Area	Acre	acre	ACRE	Square meter	M^2	SQ.M
	Square foot	ft^2	SQ.FT	Square meter	M^2	SQ.M
Concentration	Grains per standard cubic foot	gr/scf	GR/SCF	Grams per cubic meter	g/m^3	G/CU.M
	Parts per million	ppm	PPM	Parts per million	ppm	PPM
	Pounds per million Btu	$lb/10^6$ Btu	LB/MMBTU	Nanograms per joule	ng/J	NG/J
Flow	Actual cubic feet per minute	ft^3/min (actual)	ACFM	Cubic meters per second	m^3/s	CU.M/S
	Gallons per minute	gal/min	GPM	Liters per second	liter/s	LITER/S
	Pounds per minute	lb/min	LB/MIN	Kilogram per second	kg/s	KG/S
	Ton per day	t/day	TPD	Metric ton per day	M t/d	M T/D
	Ton per hour	t/h	TPH	Metric ton per hour	M t/h	M T/H
Heat Content	Btu per pound	Btu/lb	BTU/LB	Joules per gram	J/g	J/G
Length	Foot	ft	FT	Meter	m	M
	Inch	in	IN	Centimeter	cm	CM
	Mile	mi	MI	Kilometer	km	KM
L/G Ratio	Gallons per thousand actual cubic feet	gal/1000 ft^3 (actual)	GAL/1000ACF	Liters per cubic meter	$liter/m^3$	LITER/CU.M
Mass/Weight	Pound	lb	LB	Kilogram	kg	KG
	Ton	t	T	Megagram	Mg	MG
Pressure	Inches of water	in. H_2O	IN. H_2O	Kilopascal	kPa	KPA
Temperature	Degree Fahrenheit	°F	F	Degree Celsius	°C	C
Volume	Cubic feet	ft^3	CU.F	Cubic meter	m^3	CU.M
	Acre-feet	Acre-ft	ACRE-FT	Cubic meter	m^3	CU.M

APPENDIX D

FGD PROCESS FLOW DIAGRAMS


To Stack
Bypass
Mist Eliminator
M.E. Wash
Spray Tower
Make Up
I.D. Fan
Spray Pump
From Precipitator
Reaction Tank
In-Tank Strainer
Bleed Pump
To Disposal
Make Up
Flyash Silo
Flyash Feeder
Flyash Wet'G Tank
Lime Silo
Make Up
Lime Feeder
Lime Slaker
Lime Feed Pumps
Lime Feed Tank

Cooperative Power Association, Coal Creek 2
Simplified Process Flow Diagram

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